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DIE CASTING FORECAST ISSUE

SEPTEMBER 1957

Precision Metal Molding

PMM

INCLUDING DIE CASTINGS MAGAZINE

DIE CASTINGS

INVESTMENT CASTINGS

PERMANENT MOLD CASTINGS

PLASTER MOLD CASTINGS

POWDER METALLURGY

SHELL MOLD CASTINGS

"We cut the number of parts, the number of operations and the cost."

Garth Dickens,
Chief Engineer,
General Logistics Div.
Aeroquip Corp.

see page 3

Aluminum and Zamak

In All Standard Or Special Aluminum And Zinc Based Die Casting Alloys

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You're always sure of fast trouble-free production, less scrap and lower costs when you buy from your best source of supply.

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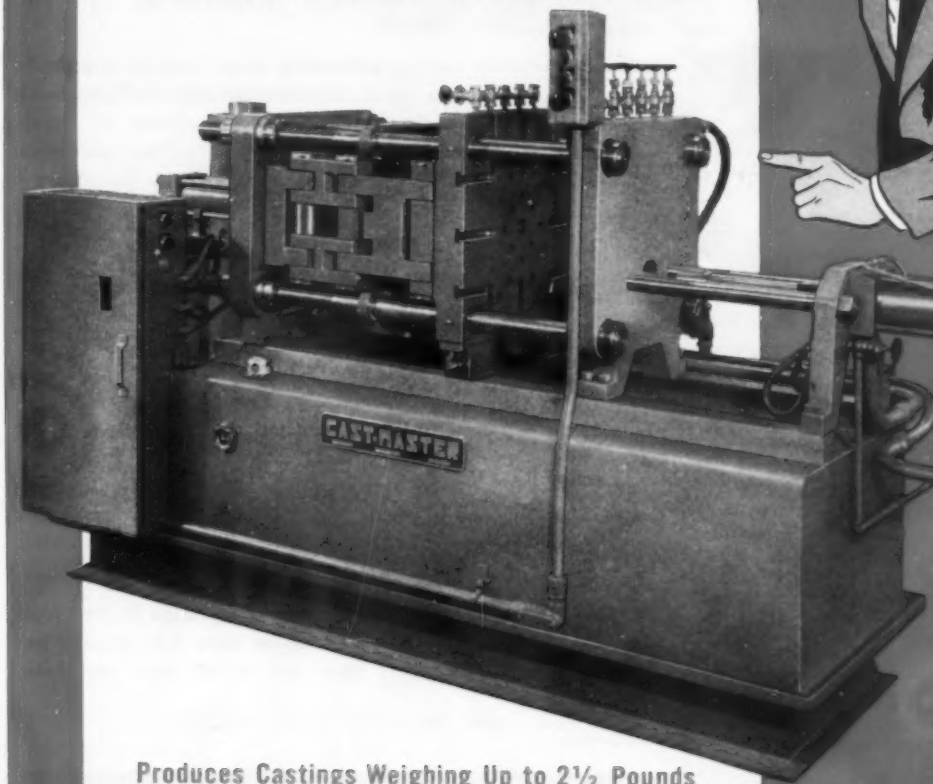

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Model 7A
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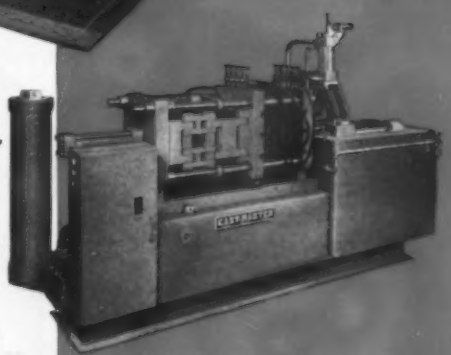
Produces Castings Weighing Up to 2½ Pounds

Great news for producers of small castings! Now you can get *quick, direct-from-stock delivery* on two new Cast-Master Die Casting Machines: Model 7Z for Zinc, Tin, Lead — Model 7A for Aluminum, Magnesium, Brass. Both feature the same outstanding design and rugged construction of the larger models now operating in America's leading plants. That means solid steel platens, extra heavy linkage with multiple shear points, and many other details that make possible safer, high-speed production of mirror-smooth, hardware-finish castings.



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Melting metals in the 60 cycle induction furnace will bring greater economy and quality to your melting and casting operations. Whether you produce zinc or aluminum die castings, brass or bronze castings, ductile iron castings, or aluminum extrusions — to name but a few fields — there is an induction furnace to do your job.

60 cycle induction melting will reduce metal losses to a minimum and eliminate metal contamination. Alloy composition is maintained uniformly, and metal temperature is closely controlled at all times. Operating conditions are ideal: worker fatigue is reduced significantly.

AJAX ENGINEERING CORPORATION has specialized in just this one field: building the best and most efficient 60 cycle induction melting furnace for the job. As pioneers of this melting principle we have accumulated considerable experience in each field of application.

AJAX induction furnaces have been instrumental in establishing new metallurgical processes such as continuous casting, continuous galvanizing, and aluminum coating of steel. Exclusive AJAX developments are the electromagnetic pump and the AJAXOMATIC for controlled pouring.

AJAX 60 cycle induction melting furnaces range in size from 20 kw to 2000 kw, produce from 150 pounds per hour up to 40 tons per hour.

MAY WE HAVE YOUR INQUIRY?

ajax

ENGINEERING CORPORATION

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September 1957: Volume 15 Number 9

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FEWER PARTS, fewer assembly operations and an ultimate lower costs are only part of the benefits that General Logistics realized when they redesigned their cargo latches with mostly die cast components. For a full report on the savings made possible see page 68.

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A report on the investment casting of wave guide components for radar work. Lower costs and superior parts come with investment casting.

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YOUR GUIDE TO BETTER DIE CASTINGS

—How to design for CHROME-PLATED DIE CASTINGS

Chromium plating of zinc die castings is often the ideal solution for improved appearance and superior resistance to corrosion and wear. Chromium is applied on top of copper plus nickel, depending on the coating thickness required and the need for corrosion resistance.

Plating Thickness: Type of service determines thickness of plating. Thinnest coatings for decorative plating, heavy deposits for wear resistance. Copper undercoating should be at least 0.00020 in.; nickel a minimum of 0.00050 for outdoor service and 0.00030 for all other service. Minimum chromium thickness should be 0.000010 in. Specify heavier coatings for severe corrosive or abrasive service.

Part Preparation: For effective durable chromium plating, parts should be free of sponginess, die markings, casting defects such as cold shuts and pinholes. Die casting based on sound design will lower costs for preparation of parts for plating.

Section Thickness: Heavy sections, thick pads or bosses can cause surface shrinks that may impair the plated finish or add to preparation cost. Thin uniform sections are better, provided thickness is heavy enough to insure smooth, even surface. Minimum wall thicknesses for zinc—0.030 in. average, 0.060 in. for larger parts; for aluminum —0.050 in. and 0.080 in.

Surfaces: Large, flat surfaces exaggerate small imperfections—some degree of crowning aids good die casting and results in better appearance. Introducing a slight pattern, raised beads, shallow ribbing or other serrated design is desirable where they will not interfere with casting and buffing.

Fillets and Corners: Generous radii and fillets should be used where possible. Rounded surfaces can be cast stronger and are easier to clean, buff and finish. Avoid sharp edges and projections. Sharp inside corners are difficult to polish. Small fillets at strengthening ribs promote good plating. Minimum fillet size—0.060 in.; outside radii not less than 0.015 in.

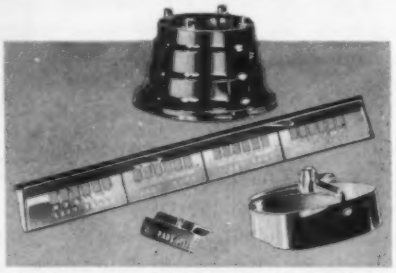


Fig. 1 — Thin walls obtained by coring out heavy sections give sounder surfaces as a base for plating.

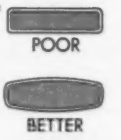


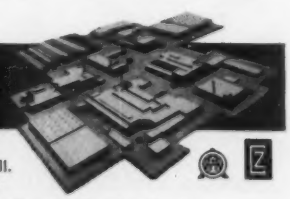
Fig. 2 — Even a slight "crowning" of flat surfaces improves appearance, facilitates polishing and plating, and cuts down rejection rate.

Parting Lines: Consider flash removal when designing parting lines. Minor design changes in the part may avoid special trimming equipment. Transferring parting lines from one surface to another can simplify trimming, buffing and finishing. Beading the parting line will reduce finishing costs by simplifying flash removal—and can also serve to blend slight mismatching of parts.

Other Decorative Platings: Brass may be substituted for chromium on the last stage of the plating process. Silver, gold or other metals can be plated on zinc after pre-plating with copper and nickel. Black coatings can be produced on zinc by electrochemical methods.

Let Precision engineers show you many economical ways to die-cast and plate durable, attractive products.

PRECISION CASTINGS CO.
DIVISION OF HARSCO CORPORATION



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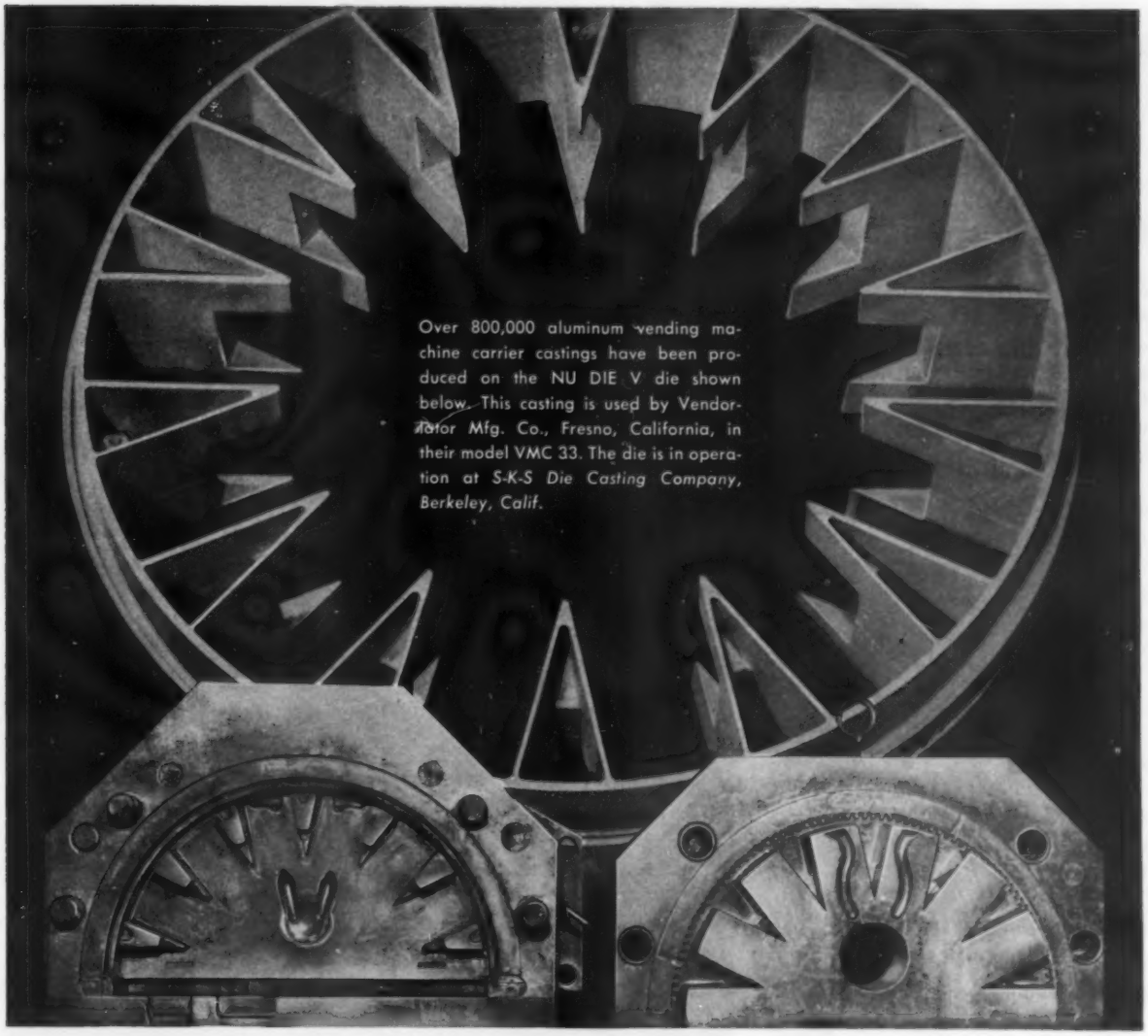

Over 800,000 aluminum vending machine carrier castings have been produced on the NU DIE V die shown below. This casting is used by Vendorator Mfg. Co., Fresno, California, in their model VMC 33. The die is in operation at *S-K-S Die Casting Company, Berkeley, Calif.*

Die of Crucible NU DIE V still in service after 800,000 "shots"

The die shown above, made of Crucible NU DIE V die casting die steel, has been in operation 10,000 hours. It has produced over 800,000 "shots" with no special maintenance required. And the die is still in excellent condition.

Long, continued runs like this develop high die heat of 700/900 F but the NU DIE V die has shown a minimum of heat checking, and is still giving dependable service. One good reason is that Crucible NU DIE V is made to die casting steel quality. And each piece is ultrasonically inspected.

Crucible NU DIE V, as well as CSM_2 for zinc die casting and holder blocks for aluminum, are available from local warehouse stocks — in 438 sizes — 1" to 40" wide, ¾" to 15" thick. When you want quality die steels fast, call Crucible. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Canadian Distributor—Railway & Power Engineering Corp., Ltd.

For more information circle No. 36 on the Reader Service Card

DIE CASTERS GET GOOD RESULTS WITH Cr-Mo-V (HIGH V)

In shop after shop, die casters are agreed that, whether working with lead, aluminum or magnesium, die casting can be performed economically with Cr-Mo-V (High V)—Bethlehem's 5 pct chrome-moly tool steel, containing 1 pct vanadium.

Cr-Mo-V (High V) promotes economy, and makes possible long production runs, because it resists wash and erosion. Moreover, it has the stamina to stay on the job for long periods, prior to the development of a fine network pattern of heat-checking.

Cr-Mo-V (High V) is uniformly annealed, to permit ease of machining. It has center density and grain refinement, and is also free from porosity. With this grade, there is little chance of cleavage cracking, assuming that adequate radii are used in the die, and the steel is properly heat-treated.

Uniform Hardness to Rockwell C 45-47

Cr-Mo-V (High V) is a uniformly deep-hardening steel, with minimum size change and warpage. Even in massive sections it can be heat-treated to a uniform hardness of Rockwell C 45-47.

Besides, it's made by a controlled melting procedure, and its quality is checked by means of ultrasonic testing.

If you'd like to undertake a trial run with Cr-Mo-V (High V), all you need do is call your Bethlehem tool steel distributor.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

This die of Bethlehem Cr-Mo-V (High V) was used in producing a popular make of aluminum fry pan.

BETHLEHEM STEEL

BETHLEHEM TOOL STEELS

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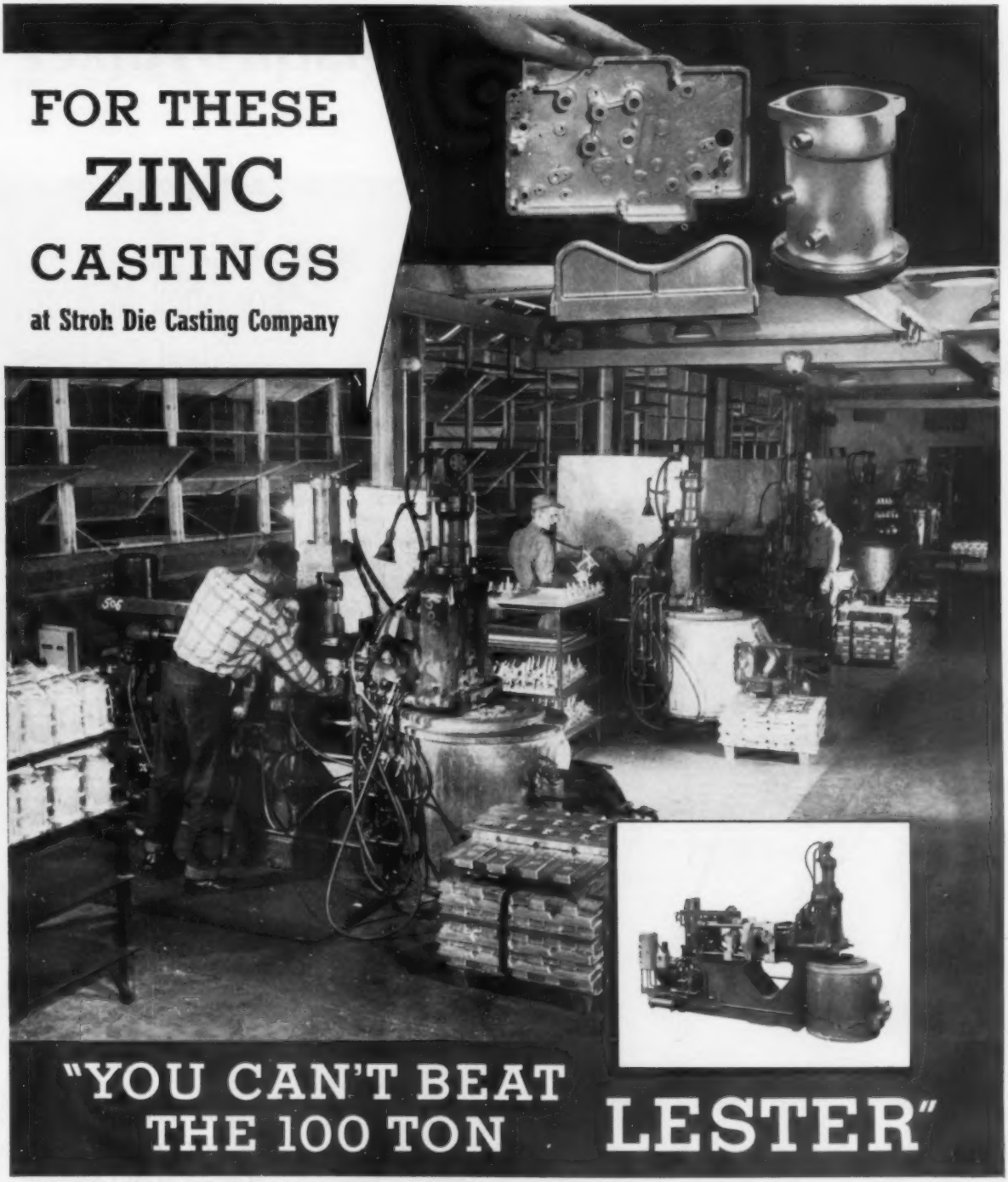
FOR THESE ZINC CASTINGS

at Stroh Die Casting Company



"YOU CAN'T BEAT THE 100 TON LESTER"

George Meier, General Manager of Stroh Die Casting Company, says:

> "For steady, dependable production on these die castings you can't beat the little 100 Ton Lester. Not only did we have a low initial investment, but maintenance costs have been surprisingly low during the entire eight years we've been using them."

The HHP-2-ZE includes among its features the famous Lester "one-adjustment" Zinc End and Central Die Height Adjustment. If you want to learn more about this rugged machine that can cast up to 6 pounds of zinc or make from 400 to 500 shots per hour, write today for Bulletin 101.

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Introducing Harbison-Walker

For Shell Molding Steel Castings

TRIED AND PROVED THROUGH RESEARCH AND PRACTICE

Forsterite grain is highly refractory magnesium silicate possessing physical properties which make it especially suited for resin-bonded shell molding. Its specific heat, thermal conductivity, high temperature stability and uniform thermal expansion—all contribute to its excellent performance.

As the result of the optimum chilling effect of forsterite grain, sufficient strength develops in the skin of the steel casting to resist outside gas pressure as well as inside ferrostatic pressure, and a smooth casting surface is assured.

H-W FORSTERITE GRAINS

are supplied in controlled sizings best suited for securing the most satisfactory shell molded casting surfaces.

H-W FORSTERITE FLOUR

is furnished for use as an additive to the H-W FORSTERITE GRAINS and resin mix to provide for the ultimate in surface smoothness, particularly of castings with heavy sections.

Write for further engineering data on H-W FORSTERITE GRAINS.

Adding another Quality Product to the World's Most Complete Refractories Service

Harbison-Walker Refractories Company

and Subsidiaries

General Offices: Pittsburgh 22, Pennsylvania

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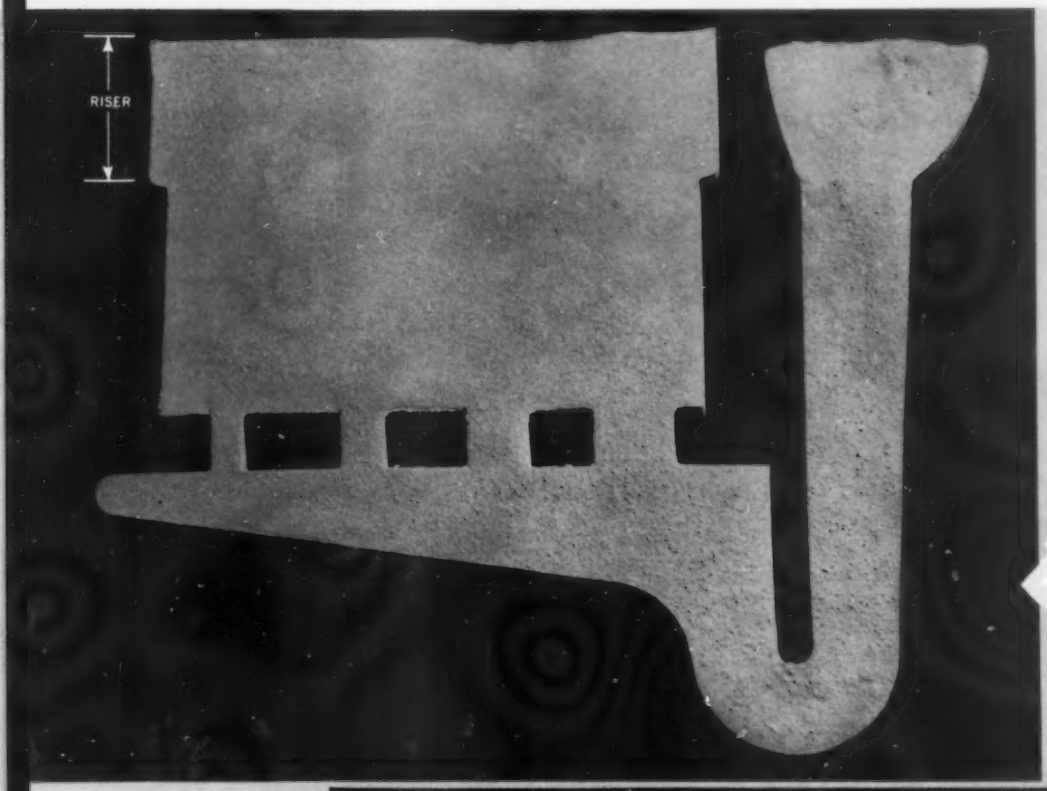
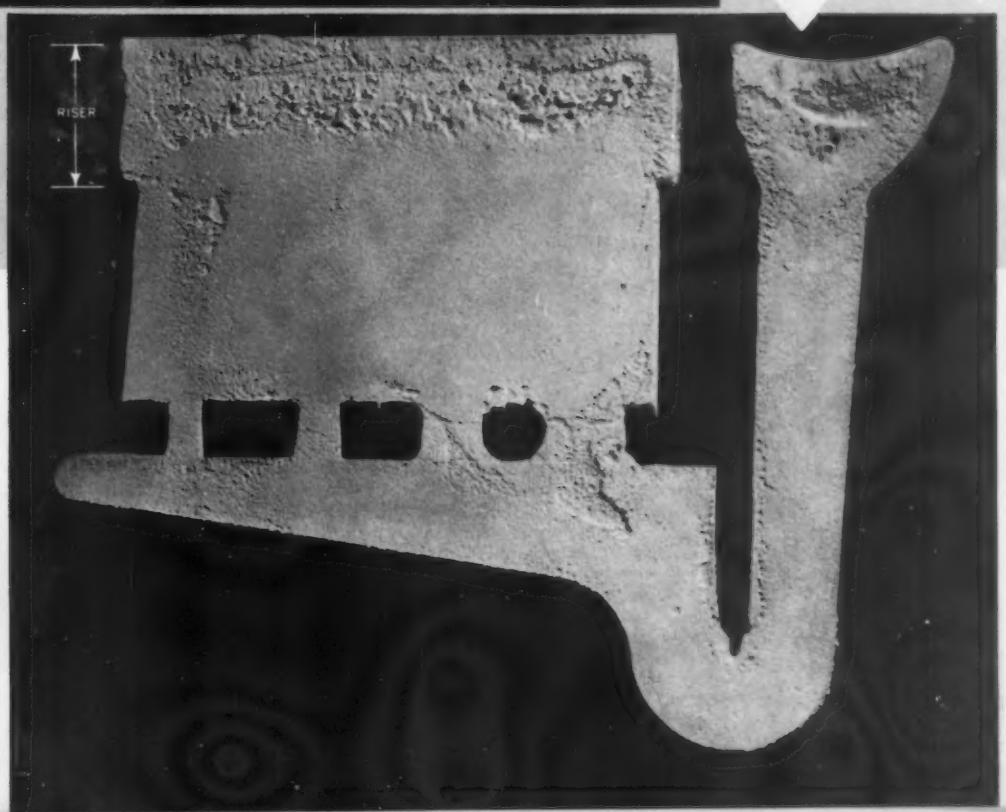
FORSTERITE GRAINS



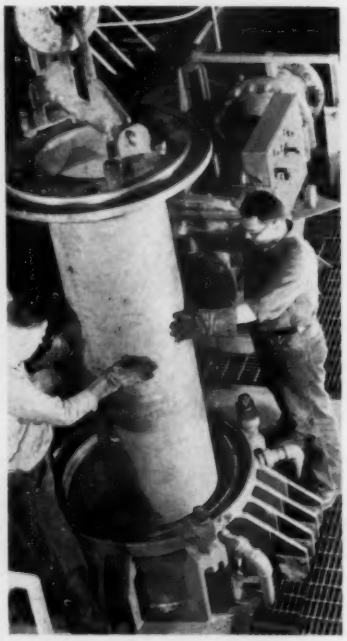
Low-carbon steel casting from H-W FORSTERITE GRAINS in shell mold with 5 percent resin.

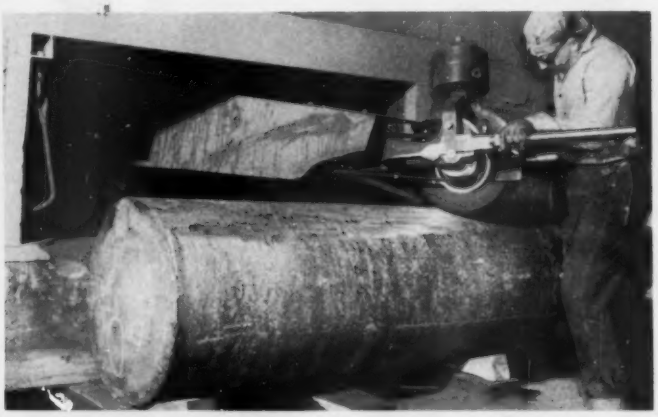
Low-carbon steel casting from silica sand in shell mold with 5 percent resin.



CASTING ABOUT

technical news of applications & processes involving precision metal moldings



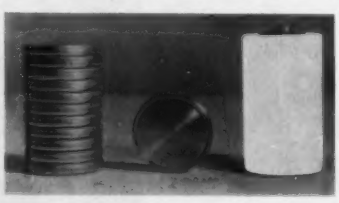


HIGH PURITY SUPER-ALLOYS are being produced now in what is described as the world's largest vacuum furnace for consumable electrode melting, just put into operation by Allegheny Ludlum Steel Corp. at its Watervliet, N.Y., plant. Ingots up to 26" diameter weighing up to 12,000 lbs are now possible commercially. Use for the larger ingots: large gas turbine wheels, landing gear parts for jet transports, steam turbine retainer rings. Copper crucible is being guided into the new furnace in view at left, while the photo above shows a workman using a swing grinder to condition the surface of a 26" ingot of super-alloy steel.

SHELL MOLD CASTINGS 93 INCHES LONG are standard production jobs at Univertical Foundry & Machine Company in Detroit. This company produces nickel anodes by the shell mold process to get high purity and optimum metallurgical properties. These castings measure 1½" x 3" x 93" and weigh about 90 lbs.

THE PROBLEM OF SELLING CASTINGS and other types of industrial parts has prompted the formation of a new organization designed to bring together manufacturers looking for sales representation with salesmen looking for new lines to handle. Formed by a company with many years of experience selling castings and related industrial products, the new organization is the Manufacturers' Agent Division of The Metal Products Sales Co. of West Hartford, Conn. For the manufacturer it provides background data on carefully screened agents who are suited for selling that type of product; for the agent, it provides background information on the company, product potential, commission rate, etc. Cost of the service is split between the agent and the manufacturer.

THE SMALLEST RECHARGEABLE SINTERED PLATE nickel-cadmium, button-cell battery has been introduced by Gulton Industries, Inc., Metuchen, N.J. The hermetically sealed button cells were developed for miniature and subminiatured electrical and electronic applications. Immediate applications: aircraft missile testing, telemetering, radio and emergency lighting. Built of patented sintered plates, the cells can be stacked to obtain a battery of any desired voltage. Operating at normal temperatures, the cells are made in .25 and .5 milliampere hour sizes, each with nominal voltage of 1.2. Possible consumer uses: hobby models, flashlights, electric razors, portable radios, stair lights, toys. Size of button cells is about 1/12 that of dry cell batteries of the same voltage.



Continued on page 13

Take a close look...

For ZINC or ALUMINUM
Model 600 Cleveland with hot chamber shot end. Quickly converts to cold chamber machine.

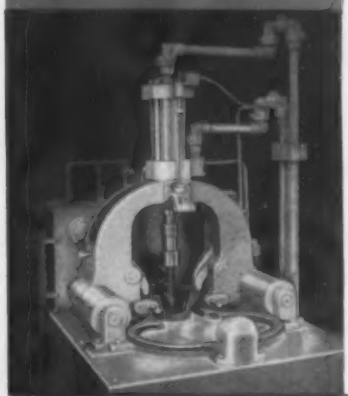
at the new model 600

CLEVELAND

Cleveland's Model 600 brings to die casters a major advancement in die casting machine design. Its dozens of highly important features—many are exclusively Cleveland's — insure exceptional performance in delivering castings of precision quality at a fast production rate.

The "600" is *massive*—with guaranteed 600-tons locking pressure (strain gage tested). Maximum weight of shot is 10 lbs. aluminum and 25.8 lbs. zinc. It has 46½" x 46" die plates; 28" x 28" space between the tie bars; 30" max. to 10" min. die thickness; 8" to 15" die opening.

Only a few "600" features are illustrated here, but these are typical of Cleveland's all-over quality construction. For full details, call in a Cleveland sales engineer and write for new Bulletin 600.



New hot chamber shot end. Improved cast steel shot cylinder and gooseneck supports permit quick gooseneck removal. High pressure swivel joints in hydraulic lines.

Plus: Automatic timing controls separate from machine, with push buttons convenient for operator's control . . . heavy, one-piece, machine-length base . . . extra rugged platens and toggles . . . dual accumulator system . . . manifold hydraulics . . . automatic lubrication . . . many other important construction features.

30 hp. totally enclosed motor drives two Vickers pumps which deliver 99.7 gal. per min. The 200 gal. hydraulic reservoir has filter capacity twice the pump capacity.

Magnet assemblies in hydraulic return line reservoir remove any metallic particles from the fluid. Adjustable bronze wedge supports for moving platen.

REMEMBER,
Clevelands Cut Costs!

THE CLEVELAND AUTOMATIC MACHINE COMPANY

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Cincinnati 12, Ohio

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CLEVELAND • DETROIT
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Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

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FOR BETTER DIE-CASTING

AMERICAN METAL ZINC-BASE ALLOYS

In the manufacture of zinc-base alloys at American Metal, Quality Control is a continuing effort . . . pursued through every phase of production . . . to ensure that characteristics are rigidly controlled to give you sounder, more uniform die-castings.

When you specify American Metal zinc-base alloys, you specify:

Premium-grade raw materials •

Sampling and testing at every production step •

Careful supervision and efficient plant and personnel •

Spectroscopic inspection •

Backed by this Quality Control and years of know-how, American Metal delivers the precise zinc-base alloy you order . . . when you need delivery.

Technical assistance and further information about American Metal Zinc-Base Alloys are available upon request.

Metal Sales Department
THE AMERICAN METAL COMPANY, LTD.
61 Broadway, New York 6, N. Y.

For more information circle No. 17 on the Reader Service Card.

CASTING ABOUT

continued from page 10

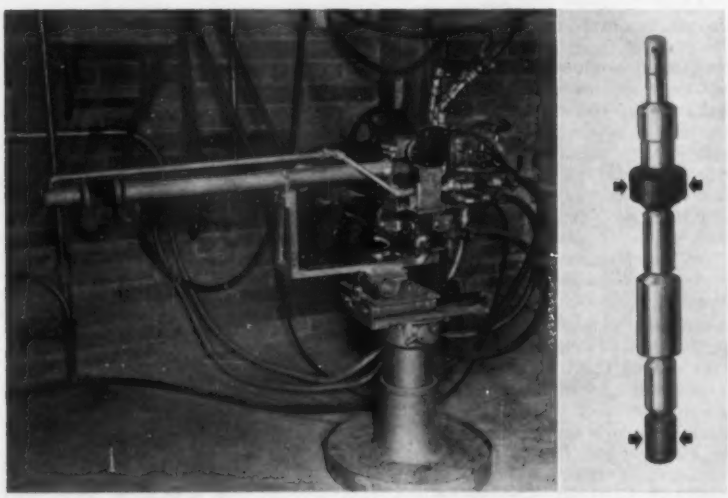
POWDER METALLURGISTS met at IBM plant in Endicott, N.Y., recently in one of the Clinic Conferences sponsored by the Metal Powder Association.

EXCHANGE OF TECHNICAL INFORMATION is one important objective of a series of Clinic Conferences set up last Fall by the Metal Powder Association. Here's how the program, initiated to stimulate free exchange of ideas and open discussion of common problems, works.

A member company, either a custom or captive fabricator of sinterings, volunteers to serve as host. Other fabricators of sinterings are invited to send two technically qualified men to the Conference. The session gets going in the morning with a guided tour of the host plant, followed by luncheon. The afternoon is given over to a "shirt sleeve" working conference in which free exchange of ideas is encouraged. No detailed minutes are kept, and participants are urged to give, as well as take information. Moderators are usually the head of the host company powder metallurgy plant, and the executive secretary of MPA.

Conferences have been held so far at Pitney-Bowes plant, Stamford, Conn.; Lionel Corp., Irvington, N.J. and International Business Machines Corp., Endicott, N.Y. Next Clinic Conference is scheduled to take place at The Presmet Corp. plant in Worcester, Mass.

TUNGSTEN CARBIDE COATINGS applied by Flame-Plating to selected surfaces of the hot air valves in Lockheed's F-104A Starfighter, have solved problems of exposure to extreme heat and abrasion. The Flame-Plated parts are said to show no wear after being subjected to actual flight testing for the service life of the part. The coating process, developed by Linde Co., Division of Union Carbide Corp. can be applied to practically any metal: aluminum, magnesium, titanium, nickel, copper, brass, etc.



FLAME-PLATING GUN to blast tiny particles of tungsten carbide or aluminum oxide onto the metal surface is shown at left. One of two hot air valves for the F-104A Lockheed Starfighter is shown at right with Flame-Plated bearing surfaces indicated.

Continued on page 17

NOW! A Revolutionary Fast Hydraulic TRIMPRESS to Exactly Fit Your Needs!

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with only 3 to 5 HP MOTORS

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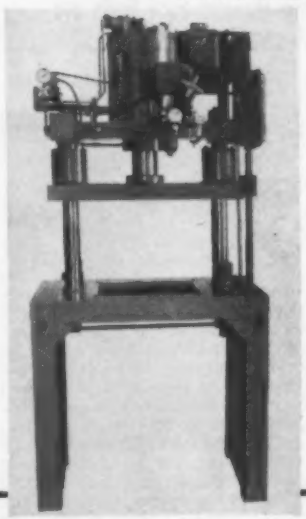

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Buffalo Metal Container Corp.

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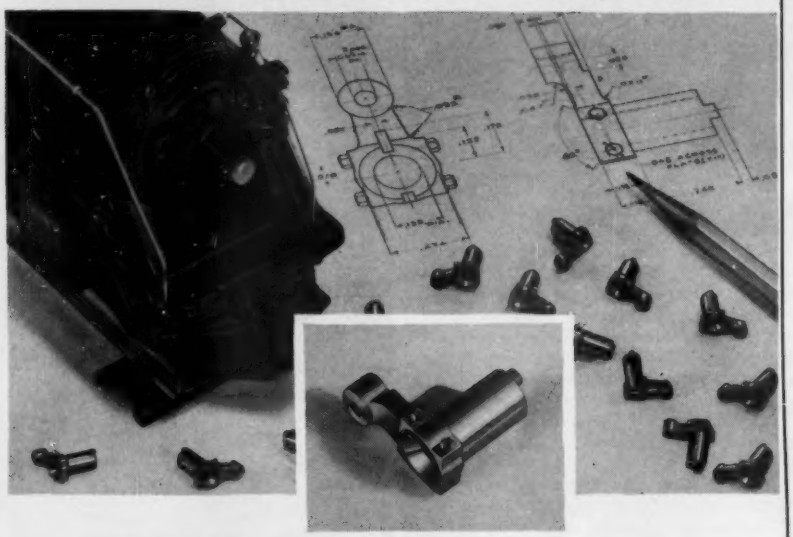
Circle No. 102 on the Reader Service Card

GRC DIE CASTING HELPS LIONEL ACHIEVE TINY PART AUTHENTICITY

Tiny, intricate, too costly to make in their own plant, GRC's specialized techniques made this toy crank economically possible



While it would seem more advantageous for manufacturers to make all parts in their own plants, some have found that a specialist can do it cheaper, faster, and some times even better. This Lionel toy crank is an example. GRC specialized techniques made it possible for them to produce this tiny authentic part more quickly and more economically than Lionel could themselves. Die cast in zinc alloy in a single automatic operation, the cost of the GRC crank was little more than $5.00 per thousand in lots of 500,000.

Miniature in size, intricate in shape, the crank has, for example, four subminiature hex nuts measuring .045" across the flats. It is typical of the many small parts problems solved by GRC, who specializes in parts "no bigger than your thumbnail". It is typical too of the close tolerances, clean edges and great accuracy achieved by Gries' methods. Whether simple or complex, quality is uniform—no secondary operations, no scrap loss. GRC delivered parts are ready for immediate use.

The world's foremost producer of small die castings, Gries' exclusive patented methods have resulted in many production economies and give broad flexibility in design. If you have a small parts problem, write for Gries' informative die casting bulletin or send prints for quotations. There is no minimum size; maximum, 1¾" long, ½ oz.

New Gries Bulletin Explains How Movable Multiple Part Units are Cast-Assembled by INTERCAST Method

The unique "intercast" method developed by Gries Reproducer Corporation for cast-assembling in one operation movable multiple part units, as well as continuously interlocked assemblies (such as chains), is explained in a new bulletin. Maximum size for "intercast" parts is 1½" long.

This patented automatic, time-saving, money-saving method is an ingenious refinement of Gries' exclusive method of small parts die casting. Gries' technique of both zinc alloy die casting and plastic molding of tiny parts is well known and has proved of inestimable value in overcoming design limitations and lowering costs. Automatic production assures precise tolerances and uniform quality.

Copies of the bulletin are available from Gries.

GRC Nylon and Other Plastic Molded Parts Accurate and Uniform

Unique, automatic molding techniques developed by Gries Reproducer Corp. permit mass production of nylon and other thermoplastic parts with exceptional accuracy and uniformity. Molding with single cavity techniques, GRC avoids lack of uniformity in size from cavity to cavity, difficulty in matching (flash and off-set at parting line), difficulty in filling. For the ultimate user it means no parts sorting to detect defectives, no selective assembly to compensate for variations, no cleaning operations.

Specializing in tiny parts (their maximum size is 1¼" long, .03 oz. in weight, no minimum), GRC can make quick deliveries on quantities from 50,000 to many millions, and will quote promptly upon receipt of blueprints or specifications. Samples and factual bulletin can be obtained by writing directly to Gries Reproducer Corp. in New Rochelle.

GRC High Series Cap Nuts Now Cataloged In Stock

Never before available to industry as a stock item from any supplier, GRC is now stocking for prompt delivery cap nuts with up to 50% greater thread depth. Immediate shipment can be made on a complete range of hex sizes from 5/16" to 5/8". Die cast in zinc alloy with long, clean thread sections, the overall height of the cap nut is well proportioned between the hexagonal section and the dome of the fastener. Protective, neat and attractive, they are rustproof, corrosion-resistant, non-ferrous, without tool marks or cut-off burrs. They have a naturally bright finish and if required any standard finish can be applied. Other GRC stock fasteners include wing nuts and screws, round head thumb nuts and screws, standard cap nuts, rivets and others. Catalog and spec sheets on the new high series cap nuts and other fastenings are available on request.

WORLD'S FOREMOST PRODUCER OF SMALL DIE CASTINGS

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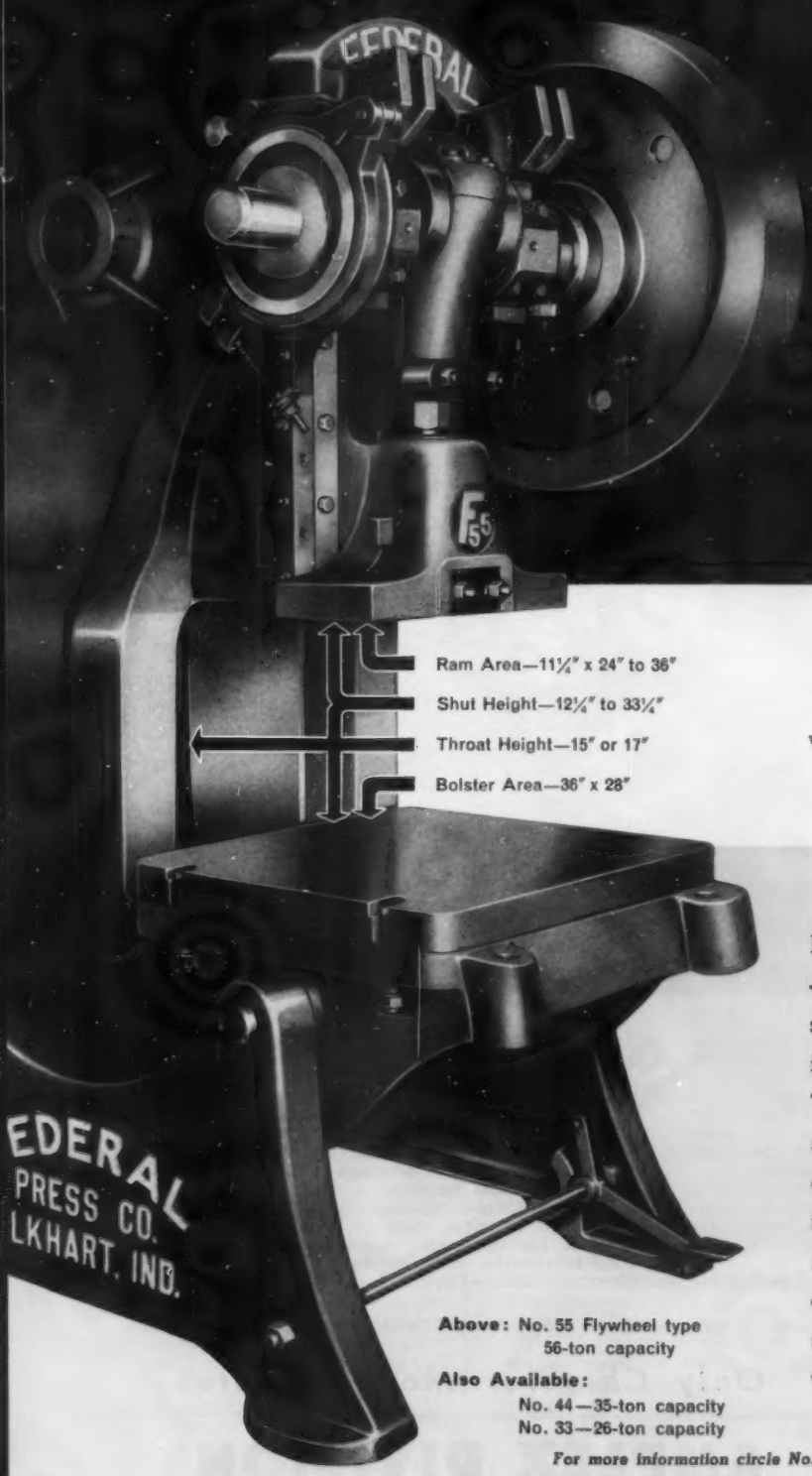
Introducing the new FEDERAL "55" for

JOBS... BIG and BULKY



Ram Area—11¼" x 24" to 36"
Shut Height—12¼" to 33¼"
Throat Height—15" or 17"
Bolster Area—36" x 28"

Featuring oversize dimensions, the Federal "55" handles work formerly confined to larger, more costly equipment

Here is a press born to handle bulky jobs—laminations, die-cast trimming, progressive die work and the like. Check its important dimensions and you'll see why. This rugged, precision-built FEDERAL is a great press for other reasons, too. It embodies the many *extra quality* features that have made FEDERAL PRESSES famous the world over. Available in geared or flywheel models, with mechanical or air clutch. WRITE NOW FOR NEW CATALOG showing complete line.

Above: No. 55 Flywheel type 56-ton capacity

Also Available:
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No. 33—26-ton capacity

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OILITE bronze pulley bearing
OILITE bronze thrust bearing
OILITE bronze water pump bearing
Photos courtesy Whirlpool-Seeger Corporation St. Joseph, Michigan
Another cost-saving application of Amplex Powder Metallurgy

Quality is a *must* for trouble free operation, continued customer satisfaction. And quality depends upon the excellence of every part, every component. For many years Whirlpool-Seeger has used OILITE center post bearings, agitator shaft bearings, water pump bearings and pulley bearings in their automatic washers. Whirlpool-Seeger uses these and other OILITE parts for very good reasons.

First of all, the manufacturer knows OILITE heavy-duty bronze bearings will meet specifications. Chrysler-Amplex precision production assures him OILITE bearings capable of carrying their loads safely, surely and quietly.

Then too, Chrysler-Amplex plant and facilities—largest and most complete of any in the metal powder fabrication industry—promises on-time deliveries in any quantity.

Moreover, in using OILITE bearings the manufacturer selects a product his customers know and respect for superior engineering.

Finally, this manufacturer, like a great many others, finds OILITE bearings—despite all their advantages—cost no more.

Chrysler-Amplex representatives and dealers are located in principal cities in United States and Canada. Let the nearby representative help you. Find him in the yellow section of your telephone directory under—"Bearings—OILITE."

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CASTING ABOUT

continued from page 13

Here's the way it works: Particles of tungsten carbide or aluminum oxide are fed into the chamber of a specially constructed gun. The particles are suspended in a mixture of oxygen and acetylene and this mixture is ignited. A detonation wave traveling at 10 times the speed of sound carries the particles through the gun barrel. The gases inside the barrel attain temperatures approaching 6000 deg. F., which heats the tungsten carbide particles to plasticity.

At supersonic speed the plastic particles are hurled at the work piece and embedded by being microscopically welded at the interface. Despite the barrel temperatures of the gun, the part undergoing plating seldom exceeds 400 deg. F. Thus, no metallurgical changes are induced and heat warping cannot take place. By successive detonations, coatings of .002 to .010 inches can be built up. These coatings can be finished to a smoothness of 1-2 microinches RMS.

POROUS CAST IRON suitable for making oilless bearings and other types of parts which have to be impregnated with oil has been reported from Japan. The Nippon Oilless Bearing Inst. claims to have developed a process by which repeated annealing of cast iron results in an expansion of volume of the material, making a permeable iron. Reported properties: tensile strength of 23,000-27,000 psi, specific gravity of 5.7, and good machinability.

MOVIES, speakers and technical publications are being offered currently to add to your knowledge of the PMM processes and related subjects. To make it easier for you, these are now available:

- *Movie*—From Westinghouse Electric Corp., Materials Manufacturing Department in Blairsville, Pa., you can arrange to see the new 16 mm color movie, "This New World of Metals".
- *Speakers*—From the Metal Powder Association, 130 West 42 St., New York 36, N.Y., you can get a new booklet listing 18 speakers available to talk on various phases of powder metallurgy. Complete background of each speaker is outlined, along with subjects on which he will speak.
- *Technical data*—From the Investment Casting Institute you can obtain a copy of the new Engineering and Design Manual giving basic design data, alloy specifications, process information and other helpful information. Price of the 50-page manual is $5.00. Address of the Investment Casting Institute is 27 E. Monroe St., Chicago 3, Ill.

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Look into the cost cutting possibilities of this new machine — premium quality castings produced at lower cost than ever before.

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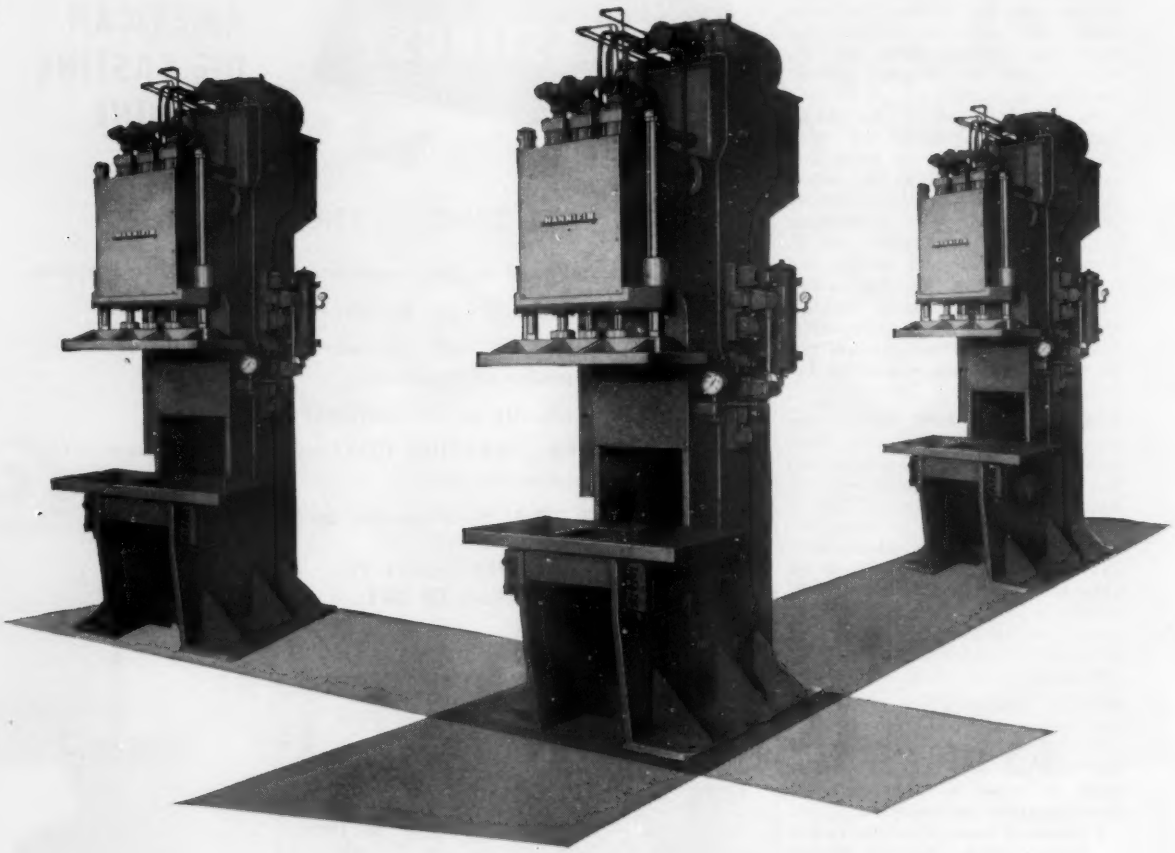
Why they trim more castings per hour with Hannifin hydraulics



Die casters who use Hannifin hydraulic Trimming Presses can quickly show you why their production rates are up.

The reason—Hannifin hydraulic Trimming Presses are different. They are specifically designed to take advantage of the desirable characteristics of hydraulic operation, yet fast enough to out-perform mechanical presses.

The really big advantage is the increased flexibility with Hannifin hydraulic power. You can have maximum rated power at any point in the stroke. That means shorter setup time, because it's so easy to adjust the press to trim at the exact point required by the die.

Hannifin presses give operators plenty of room for loading and unloading—with no sacrifice in speed and with the safety of dual controls. Operator fatigue is less because of the smoother, quieter action. Also, the smoother action of a Hannifin hydraulic press produces cleaner trims and reduces deburring and polishing time.

We believe it will pay you to investigate the advantages of Hannifin hydraulic Trimming Presses.

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PRESSES

Hannifin offers **a complete line of hydraulic presses, including special and "modified standard" models of great speed for specialized applications like trimming. For complete information, write Hannifin Corporation, 581 So. Wolf Rd., Des Plaines, Illinois.**

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Betty — the Martin girl says

Martin solves production bottlenecks...

MARTIN

gets specified die-cast components to you in quickest possible time!

Whatever the size of your order, there s no waste time or motion at Martin. Why? Because each year our Cost Analysis Engineers spend hundreds of man-hours further streamlining our already-streamlined production facilities. This means quick-as-a-wink service for YOU. Streamlining production not only means faster delivery, but lower costs, which are immediately passed on to you.

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Shown above are representative sleeves which we produce

We believe we have the finest facilities in the industry for manufacturing such precision die-casting components as: COLD SHOT SLEEVES . . ADAPTER BUSHINGS . . FEED CHAMBERS . . PLUNGER TIPS . . AND GOOSENECK SLEEVES.

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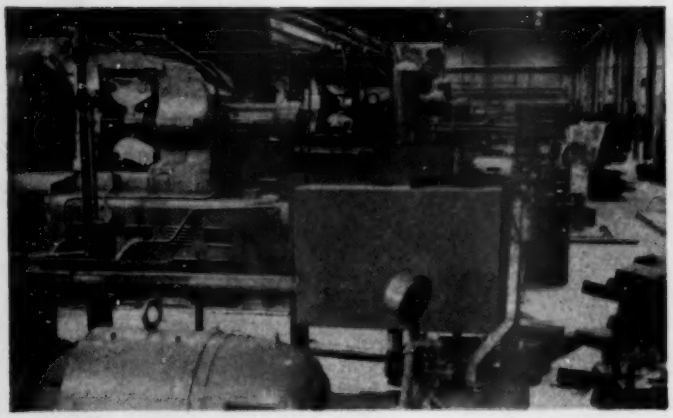

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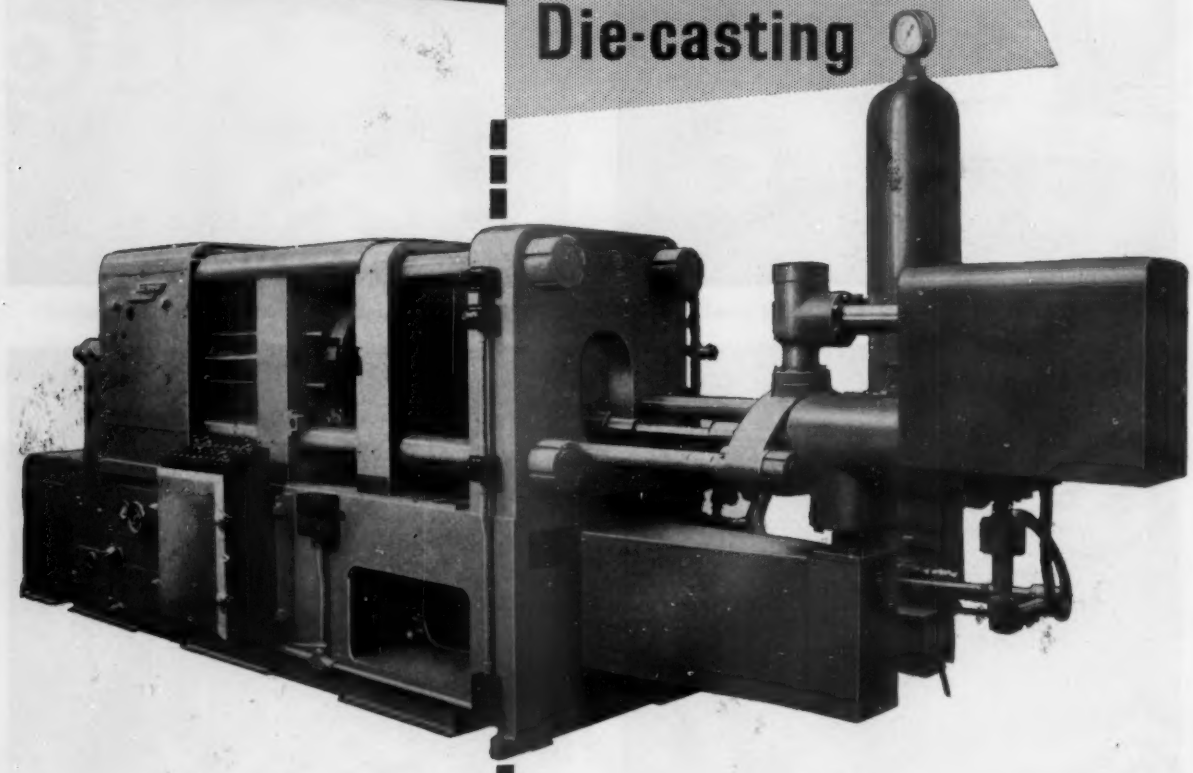

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A Touch here does so much

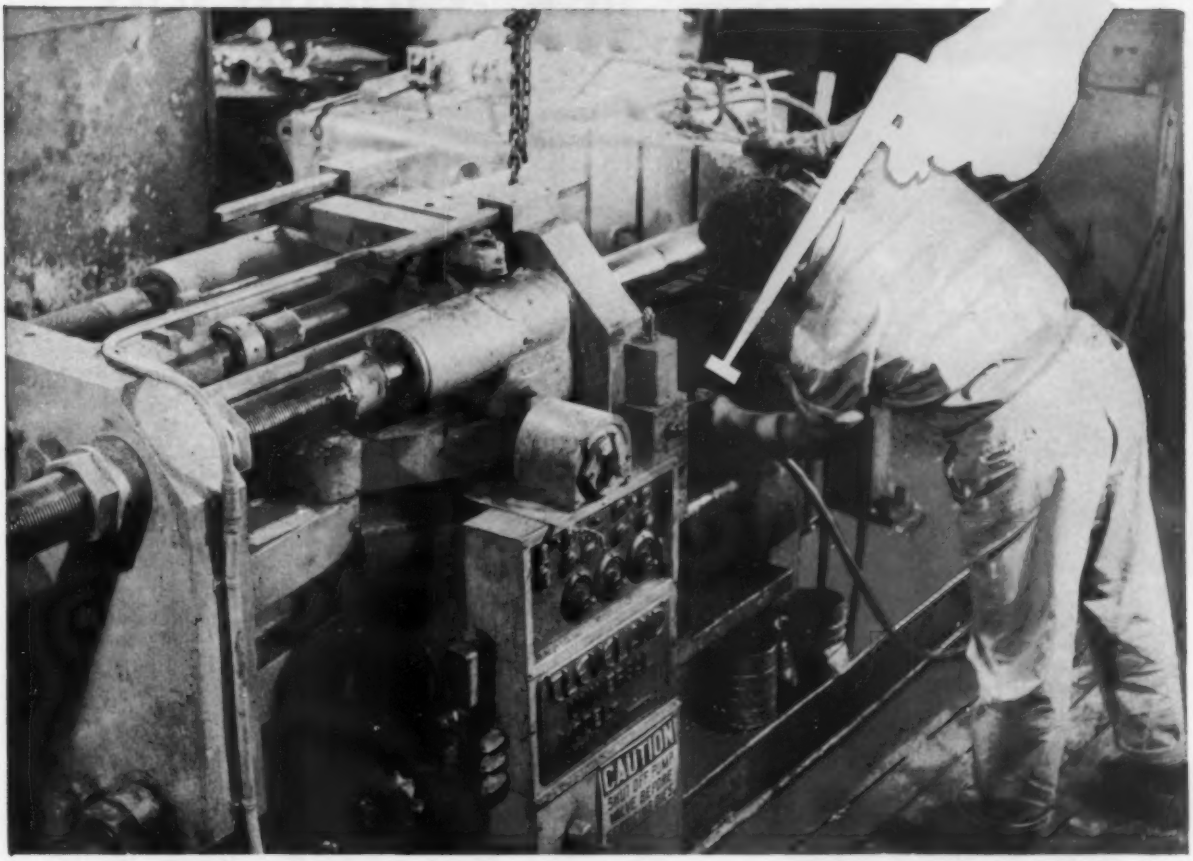

Photo courtesy Bendix Foundries

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Conventional lubricants burn up at 400°F. So what happens when aluminum and magnesium are die cast at 1300°F.? What happens to die surfaces subjected to the scrubbing effect of 30,000 p.s.i. pressure?

The answers are unpleasant and unprofitable ... surface folds, porosity, bad parting; metal build-up on the die face, and shortened die life.

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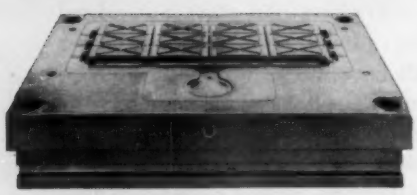
Latrobe's . . . VDC and pre-hardened VISCOUNT 44

Die Casting Die Steels

Rack for assembling electronic parts (approximately 2 feet long by 1 foot wide and weighing 2.05 pounds) produced for Northrop Aircraft, Inc., Northrop Div., Hawthorne, Calif.

Harvill Corp., Los Angeles, Calif. had to produce this part DEAD FLAT at a minimum cost . . .



The problem of producing this die casting die at a minimum cost was a natural for Latrobe's VDC and Viscount 44 die casting die steels.

The die parts, not affecting the critical flatness, were made of Latrobe's VDC die casting die steel, an air-hardening, 5% chromium die steel possessing excellent machinability and superior resistance to wash and heat checking. For the die parts demanding dead flatness, the use of Latrobe's Viscount 44 prehardened die casting die steel eliminated all possibilities of warpage from heat treatment and subsequent costly grinding time to correct warpage. Die surfaces were machined to exact size! Heat treat was eliminated!

Latrobe's Viscount 44 is an air hardening, 5% chromium die steel containing 1% vanadium that imparts excellent physical properties for hot work applications. Furnished prehardened, in a range of Rockwell C 42-46, Viscount 44 is practical to machine in its prehardened form as a result of the alloy sulphides it contains. Years of experience in the production of DESEGATIZED® steels have made it possible for Latrobe to uniformly distribute these free-machining sulphide additives throughout Viscount 44.

Use Viscount 44 for your next critical die casting application. Your nearest Latrobe representative will be pleased to give you complete data . . . and warehouse stocks are available for immediate delivery.

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STEEL COMPANY
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PMM BOOKS

THE DE VILBISS SERVICE MANUAL, The De Vilbiss Co., Toledo, Ohio. Price $2.50.

Totalling 405 pages, the new service manual contains a full parts list and general information on the installation, operation and maintenance of spray equipment.

Compiled at the request of resale outlets, the new manual provides up-to-date literature and reduces errors in ordering material and service parts. It replaces previous manuals which were kept current by the periodic mailing of replacement pages.

The manual is divided into three sections. Section one deals with service policies and includes the general index. Section two provides complete information on Exchange Service. Part three is the parts list section. Illustrations show how the equipment is to be installed, operated and adequately maintained.

CAST METALS HANDBOOK, By The American Foundrymen's Society; Des Plaines, Ill. Price $10.00. To AFS Membership, $7.00.

A reference book dealing with basic "know-how" in cast metals. The new handbook is for design engineers to use when developments from drawing boards and research laboratories must be converted into components and end products.

Compiled specifically to enable the user of cast metals to select the material best suited for his purpose, the handbook gives the needed information that will facilitate cooperation with foundries to obtain the castings which will best meet specific engineering requirements.

In addition to providing working data for utilizing the properties of cast metals to the greatest engineering advantages, the book also presents substantiated information on new developments in cast materials and practical up-to-the-minute facts on how to get the most out of castings designs.

It promises to be a useful addition to any engineer's library or designer's reference file. It is seldom that such a complete set of facts is brought together between to covers as efficiently as in this volume.

CASTABILITY.. Hardenability High Conductivity..

ONLY IN Beryllium Copper CASTING ALLOYS

HIGHEST STRENGTH with MODERATE CONDUCTIVITY

BRUSH Alloys 250-C and 200-C can be hardened to the strength of steel (155,000 to 180,000 psi Tensile) by simple heat treatment, while maintaining 20% to 25% of the thermal and electrical conductivity of pure copper. USEFUL FOR: molds, bearings, gears, cams, valves, pumps, plungers, drawing dies, flash welder dies and other high strength and wear resistant parts.

250-C
Be . . 2.60-2.85%
Co . . 0.35-0.65%
Cu . . balance

200-C
Be . . 2.00-2.25%
Co . . 0.35-0.65%
Cu . . balance

HIGH CONDUCTIVITY with HIGH STRENGTH

BRUSH Alloys 55-C and 35-C are specified where highest thermal and electrical conductivity are required. By combining 45% to 50% of copper's conductivity with high strength (95,000 to 120,000 psi Tensile), these alloys find application in: switch and circuit breaker contacts, welding electrodes, slip rings and contact arms, and parts in which conductivity and strength at elevated temperature are vital.

35-C
Be . . 0.25-0.50%
Ni . . 1.40-1.60%
Cu . . balance

55-C
Be . . 0.55-0.75%
Co . . 2.40-2.60%
Cu . . balance

Brush Beryllium

BERYLLIUM COPPER CASTING ALLOYS
BeCu

BERYLLIUM METAL
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THE BRUSH BERYLLIUM COMPANY, 4301 PERKINS AVE., CLEVELAND 3, OHIO

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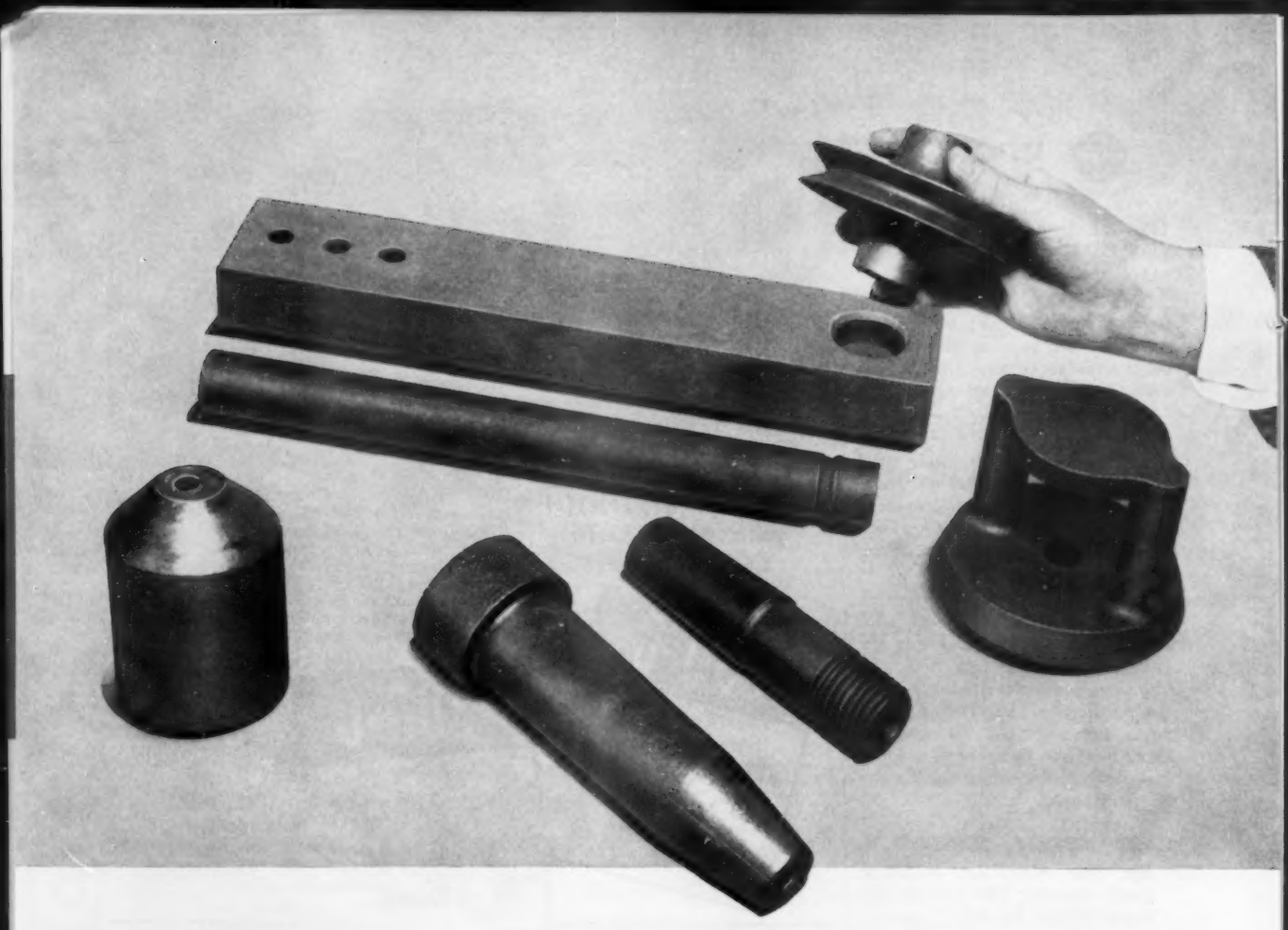

Molten aluminum can't wet these parts

All these parts and fittings for aluminum die-casting and direct-chill casting are made of REFRAX® silicon-nitride-bonded silicon carbide. All are precisely formed. Yet molten aluminum can't wet them, can't harm them. That alone recommends REFRAX parts and shapes for aluminum holding furnaces and aluminum alloying furnaces (including reverberatory and induction). They are Carborundum's answer to the need for a material that can be formed into intricate parts with outstanding corrosion resistance far above normal melting temperatures.

Consider the value of these other properties in your operation: Tolerances of ±.0005 in./in.; a modulus of rupture of 5600 psi at 2450°F (even the best heat-resistant alloy melts below this temperature); and high heat conductivity that approaches that of chrome-nickel steel. Mail the coupon today for complete information.

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- ☐ Current issue of Refractories magazine on REFRAX
- ☐ Reprint of article in Product Engineering, Feb. '57 entitled "Nitride-bonded silicon-carbide bridges gap between metals and ceramics".
- ☐ Bulletin on REFRAX

Name_____ **Title**_____

Company_____

Street_____

City_____ **Zone**_____ **State**_____

an announcement of interest to design engineers

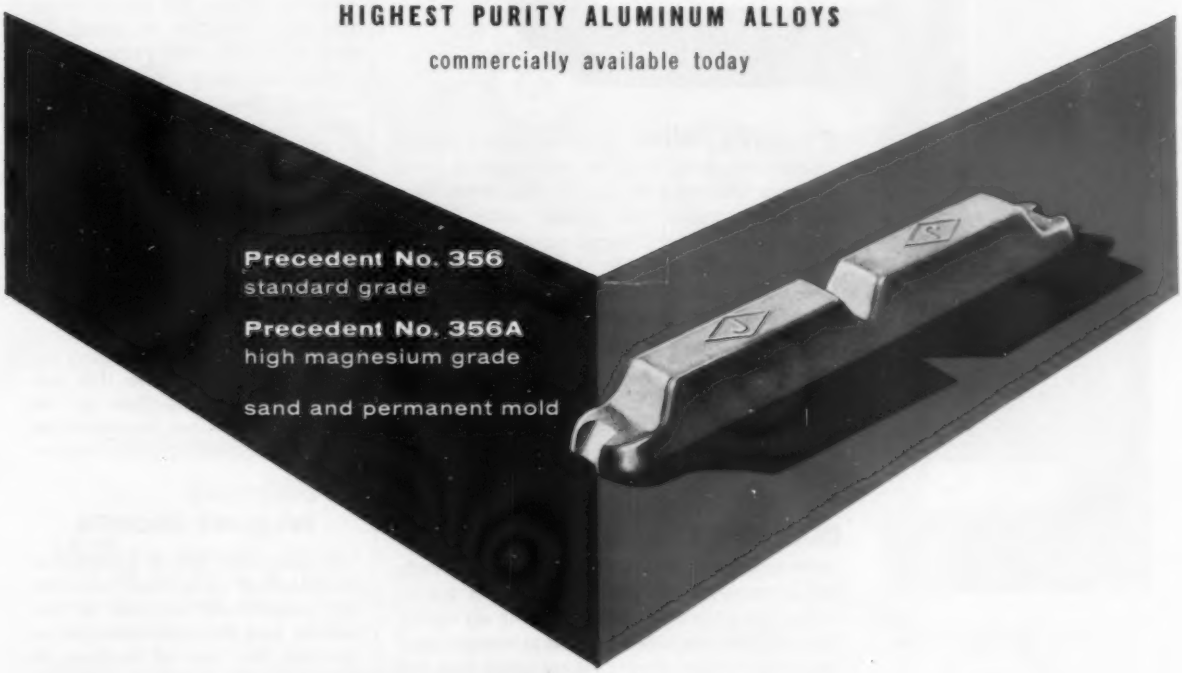
WILLIAM F. JOBBINS, INCORPORATED

presents the

Precedent Series

HIGHEST PURITY ALUMINUM ALLOYS

commercially available today



These are the first in a new series of highest purity aluminum alloys developed to provide product design engineers with superior properties in tensile strength, shock resistance, dimensional stability, ductility and corrosion resistance.

for complete information, write Mr. Joseph J. Stumm

WILLIAM F. JOBBINS, INCORPORATED P. O. BOX 230, **AURORA, ILLINOIS**

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UCON
BRAND
HYDROLUBES

FIRE

PROTECTION The fire-resistance of CARBIDE's fire-resistant hydraulic fluids has been proved by severe, exhaustive laboratory tests. And, in actual service, water-base UCON hydrolubes have prevented serious fires and injuries during more than 10 years of routine use in all types of industrial hydraulic equipment. The common fire hazards connected with hydraulic operations are eliminated when UCON hydrolubes are used. UCON hydrolubes are classified as acceptable, less hazardous fluids by Factory Mutual Laboratories.

ECONOMY UCON hydrolubes 150-CP and 275-CP are the economical answer to fire-resistance in hydraulic fluids. Most commercial hydraulic equipment can be easily converted to UCON hydrolubes with a minimum of time and expense. UCON hydrolubes have no harmful effects on most packings or seals. In fact, in many instances, reduced leakage losses have been reported. UCON hydrolubes also provide maximum protection against liquid and vapor phase corrosion and have outstanding anti-wear characteristics—thus, pump replacement costs are also held to a minimum.

Why not get all the facts on how UCON hydrolubes can mean protection plus economy for you. Write today for the booklet, "UCON Hydrolubes Spell Safety," F-40134.

UNION CARBIDE CHEMICALS COMPANY

Division of UNION CARBIDE Corporation

30 East 42nd Street, New York 17, N. Y.

"Ucon" is a registered trade-mark of UCC.

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PMM

LETTERS

the readers' forum

PERMANENT MOLD FOUNDRIES

We are planning to add the facilities for casting aluminum in our foundry by the permanent mold process or method.

Can you suggest the names of sources for permanent molds as well as the manufacturers of the machines in which the molds can be mounted and used? — C.C.T. chief engineer.

We are interested in finding out the names of people who make permanent mold machines. Could you give us a list of these people? We shall be very much indebted to you for any information you can give us along this line. — H.E.M., vice pres.

The information asked for by both of these readers has been forwarded to them. — Ed.

METAL FINISHING

I would like to obtain a reprint of an article which appeared in PRECISION METAL MOLDING for February 1957, page 60, on a pre-paint treatment for aluminum castings. I would also appreciate it if you could send me any additional information on this subject, including the name of the company which has developed the process, if this is available. — M.V.V.

INDUSTRY GROWTH

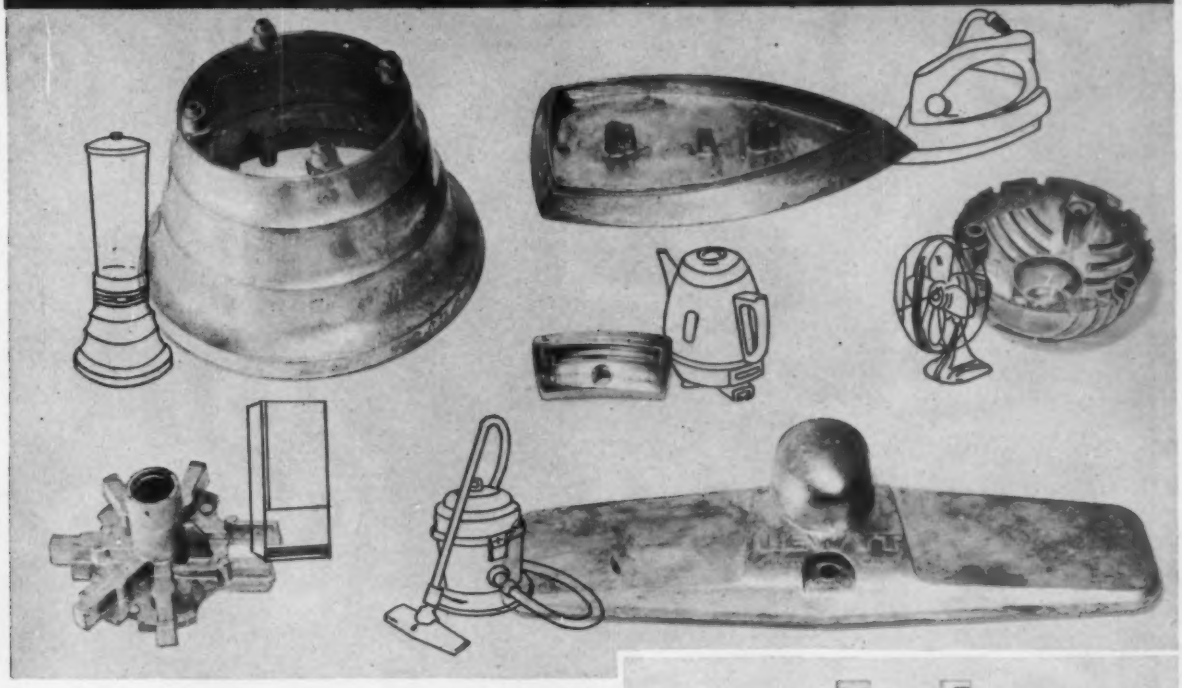
Please send me a graphical presentation or a chart showing the progress of increase of aluminum and zinc die castings, indicating the rate of increase in approximately five year intervals, for the period starting approximately 1930 to present. — J.H. Prod. Eng.

Reprints of PMM articles plus other information sent. — Ed.

As a recent graduate in mechanical engineering, I have just begun work with this company in the Product Engineering Department. I can not divulge the nature of our work since it is classified. However, a senior engineer, one of your subscribers, has recommended that I ask to be put on your mailing list in order to keep abreast of the newest developments in the field. If I

Continued on page 37

HOME APPLIANCE PARTS



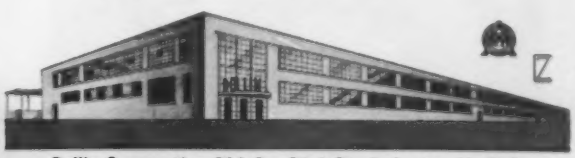
DOLLIN Die-Casting facilities and methods assure

Lowest cost • Fine quality
High-speed, volume production
Dependable delivery

DOLLIN has produced millions of aluminum and zinc die-cast parts for leading home appliance manufacturers in almost unlimited sizes, designs, shapes, intricacies and finishes.

DOLLIN is ideally set up for low-cost, high-volume production of die-cast appliance parts . . . from original drawing to delivery of complete parts ready for assembly. Extensive facilities include the most modern equipment for large aluminum and zinc castings, as well as specially-designed, high-speed, fully automatic machines for small zinc castings. Complete engineering, die-making and machining services available. Choice of chrome, brass or gold plating, painting, lacquering or other finish desired.

For cost-cutting suggestions, quotations and engineering advice, submit drawings or samples of your parts, without obligation.



DOLLIN Zinc & Aluminum DIE-CASTINGS

Dollin Corporation 614 So. 21st St., Irvington 11, N. J.

SALES OFFICES: Boston • Buffalo • Canton • Charlotte • Chicago • Detroit • Louisville • Philadelphia • Pittsburgh • St. Louis • St. Paul

For more information circle No. 43 on the Reader Service Card

HB&S "CAMERA" STOPS METAL IMPURITIES BEFORE YOU CAST!

The two strips above are the spectrograms used in checking the composition of one heat of HB&S Zamak-5.

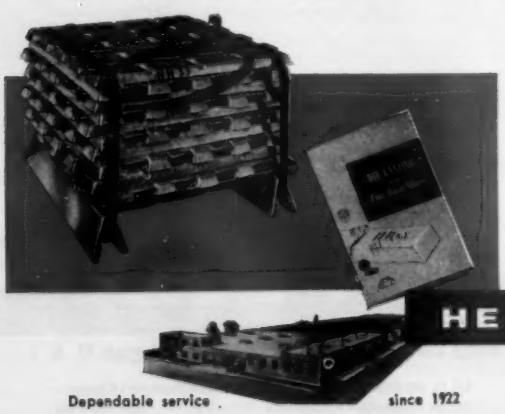
The top ARC spectrum shows the Impurities — Lead, Tin, and Cadmium — to be present as minute traces.

The bottom SPARK spectrum shows the Principal Alloying Elements — Copper, Aluminum, and Magnesium — to be present in proper proportions, proving this sample in spec.

Specifically engineered and quality controlled to meet your exact casting needs, HB&S Zamak alloys are sampled while still in the molten state, spectrographically analyzed to assure the purity and uniformity of the metal. Each element in the alloy, in each heat, is fingerprinted and recorded. As the molten metal is poured into bars the alloy number is stamped on each bar . . . the heat number is marked on every pallet, you know exactly what you're getting . . . are assured of uniformity. All important steps in Henning's start-to-finish control which guarantees ingots ordered will be 100% on spec.

Still another Henning service . . . alloy bars are shipped on consumable skids.

HB&S quality . . . HB&S service . . . cost no more . . . save you time and money in better castings. Write for Henning's FREE booklet "Die Casting with Zinc Alloys", a technical guide for plant managers and die casting machine operators, available in quantities.



HENNING BROS. & SMITH, INC.

91-117 Scott Ave., at Randolph St., Brooklyn, N.Y.

Smelters and refiners of aluminum, bronze, brass, zinc, lead

Dependable service since 1922

For more information circle No. 57 on the Reader Service Card

This alloy "shopping list" saves many a day for busy metallurgists!

AISI		AMS			SAE	
302	410	5333	5376	5631	30302	51442
303	414	5334	5378	5640	30303	51446
304	416	5350	5380	5643	30303F	60303A
308	420	5351	5382	5645	30304	60304
309	430	5352	5385	5665	30310	60310
309+W	430F	5354	5386	5700	30316	60316
310	431	5355	5388	5710	30321	60347
316	431A	5358	5389	5735	30347	60410
321	436	5360	5392	5765	51410	60420
327	440A	5361	5393	6270F	51414	60442
329	440B	5362	5394	6274F	51416F	60446
330	440C	5363	5526	6280C	51420	70310
331	440F	5366	5537	6350	51430	70310A
347	442	5369	5610E	6382	51431	70327
403	446	5370	5616	6428	51440A	70330
406		5372	5621	7834	51440B	70331
		5373	5628		51440C	70446
		5375	5630		51440F	

MISCELLANEOUS

Armco 17-4PH • GMR 235 • Inconel® • Invar • Monel® • NiResist® IA • NiResist® IIA • NiResist® III • Waspalloy

®Ⓡ International Nickel Co.

You name the alloy... we'll produce to your specs. —in record time!

THE watchword of CANNON-MUSKEGON is "CONTROL." Careful selection of the finest raw materials . . . rigid melting procedures . . . complete chemical and physical testing facilities, plus closely supervised handling — produce alloys to your most exacting standards. More than 100 special and standard alloy analyses are produced each year.

The alloy list above is typical of production "regulars" for scores of users in all industrial fields. If you don't see what you need — remember, our facilities are open to "tailor" alloys to your specific needs. We'll also recommend proper in-plant handling and heat treating procedures to assure the desired physical and chemical properties in your final product.

FOR IMMEDIATE REFERENCE — write for your personal copy of Cannon-Muskegon's 6-page handbook for metallurgists, giving you data on both UltraMet and MasterMet alloy service.

ULTRA MET — VACUUM-MELTED ALLOYS FOR INDUSTRY

MASTER MET — CERTIFIED ALLOYS FOR INDUSTRY

and CANNON-MUSKEGON offers you both vacuum and air-melting facilities for cobalt-, ferrous- and nickel-base alloys in a wide variety of cast forms

UltraMet alloys are produced in this latest design vacuum melting furnace — production center for a virtually unlimited variety of high temperature, corrosion resistant alloys for severe-stress applications.

CANNON-MUSKEGON CORPORATION

2871 Lincoln St. • Muskegon, Michigan, U.S.A.

METALLURGICAL SPECIALISTS

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knobs and nameplates help sell cars . . .

so

CHRYSLER

suppliers

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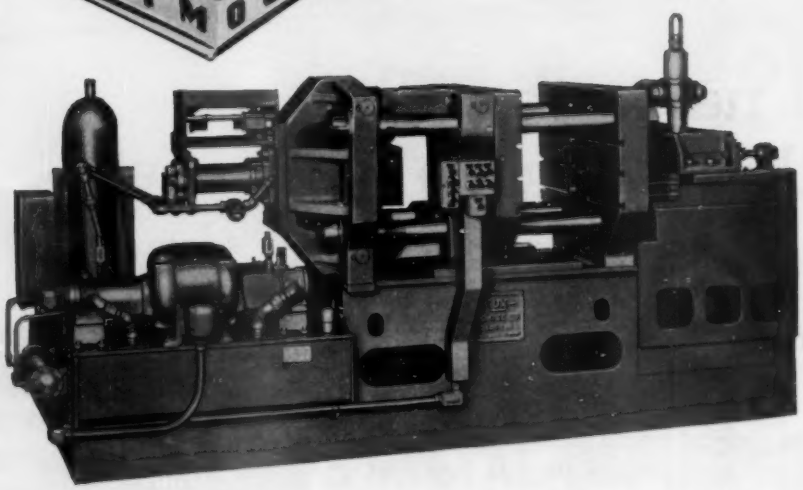


KUX DIE CASTING MACHINES

to get hardware finish quality castings

Big Chrysler Corporation contracts for die-cast trim parts are held by the Trilex Corporation of Wayne, Michigan, and Ajax Manufacturing Corporation of Detroit.

"The primary concern of the Chrysler Corporation is quality," says Mr. John Airey of Trilex. "That's why we chose KUX machines; we know they produce hardware finish quality parts."

"But Chrysler considers price as well as quality," said Mr. Milton K. Pitts of Ajax. "We choose KUX because they put us in a better position to compete on a cost-per-unit basis."

Whether your main concern is lower production costs, quality, or both, investigate the advantages of KUX machines. Quality die castings economically produced often make a tremendous difference in price and salability. KUX, first name in die casting machines, can help make that difference for you! Write for our NEW illustrated catalog.

MODEL BH-30 ILLUSTRATED

Hydraulically operated goose neck plunger type die casting machine for production of zinc, lead or tin castings.

KUX MACHINE CO. 6725 NORTH RIDGE AVENUE • CHICAGO 26, ILLINOIS

For more information circle No. 69 on the Reader Service Card

Tear this chart out and preserve it

YOUR GUIDE TO COLUMBIA HOT WORK TOOL STEEL GRADES

TYPE AND GRADES	DESCRIPTION	HARDENING RANGE	QUENCH	TEMPERING RANGE	USEFUL HARDNESS
* H26 — CLARITE HW	Full tungsten hot work steel with modified carbon and vanadium for highest resistance to softening at elevated temperatures with best wear resistance and medium toughness.	2100° F. to 2250° F.	Oil or Salt Bath	1050° F. to 1250° F.	58/52 Rc
* H24 — FORMITE NO. 3	A high tungsten hot work steel with good heat resistance to softening and wear, good toughness for brass die casting dies.	2000° F. to 2200° F.	Oil or Air	1050° F. to 1250° F.	56/48 Rc
* H21 — FORMITE NO. 2	Reduced tungsten hot work steel with good resistance to softening and wear and high toughness.	2000° F. to 2200° F.	Oil or Air	1100° F. to 1250° F.	54/42 Rc
* H43 — MOLITE HW10	A high molybdenum 2% vanadium steel with modified carbon for high resistance to softening and good wear resistance with high toughness.	1800° F. to 2100° F.	Oil or Air	1100° F. to 1250° F.	56/48 Rc
* H13 — VANADIUM CASTDIE	Air hardening chromium molybdenum 1% vanadium for die casting aluminum dies, cores and ejector pins.	1825° F. to 1900° F.	Air	1000° F. to 1200° F.	52/38 Rc
* H12 — ALCODIE	Chromium molybdenum tungsten vanadium air hardening hot work steel, resists softening with good resistance to wear and heat checking	1825° F. to 1875° F.	Air	1000° F. to 1200° F.	52/38 Rc
* H11 — CASTDIE	Chromium molybdenum with 1/2% vanadium air hardening type with widest range of uses, good resistance to softening and wear with high toughness and may be water cooled. All kinds of die casting dies, cores and ejector pins.	1800° F. to 1850° F.	Air	1000° F. to 1200° F.	52/38 Rc

* A.I.S.I. TYPE CLASSIFICATIONS

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILLINOIS

CENTRAL OFFICE AND WORKS, CHICAGO HEIGHTS, ILLINOIS — BRANCH STOCKS IN THE FOLLOWING CITIES:

1957-58

Chicago 32, 4832 S. Kedzie Ave., Phone LAfayette 3-3632
Cincinnati 25, 2716 Spring Grove Ave., Phone MUlberry 1-8400
Cleveland 14, 1640 St. Clair Ave., Phone MAin 1-1785
Detroit 3, 121 Oakman Blvd., Phone TUlsa 3-3770
Los Angeles 22, 6955 E. Bandini Blvd., Phone RAymond 3-4684
Milwaukee 19, 5202 W. Lincoln Ave., Phone LIncoln 3-5200
St. Louis 13, 5118 Easton Ave., Phone FOrest 1-0641

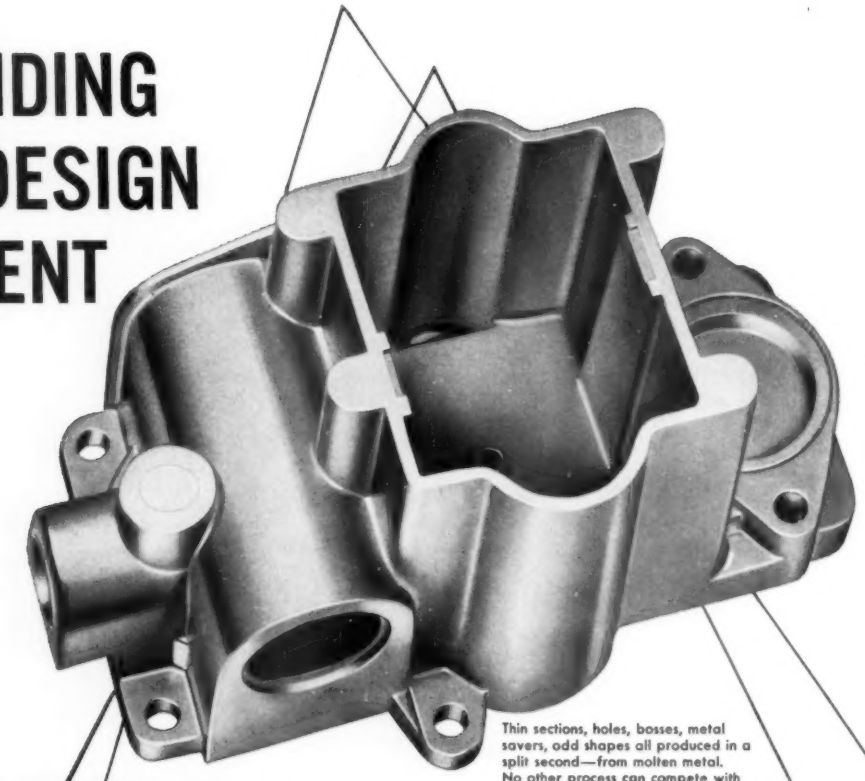
REPRESENTATIVES IN THE FOLLOWING CITIES: Dayton, Erie, Grand Rapids, Hartford, Indianapolis, Louisville, Moline, Newark, Portland and St. Paul

TOOL COLUMBIA STEELS

COLUMBIA TOOL STEELS

HIGH SPEED STEELS: Clarite — Vanite — Carvite — Acmite — Cobite — Maxite — Molite — Molite Smoothcut — Molite #3 DIE STEELS: Superdie — Atmodie — Atmodie Smoothcut — E-Z-Die Smoothcut — Oildie — Exl-Die — Framdie SHOCK RESISTING STEELS: Buster Alloy — CEC Smoothcut CARBON TOOL STEELS: Columbia Special — Vanadium Extra — Waterdie Extra — Columbia Extra — Columbia Extra Headerdie — Vanadium Standard — Waterdie Standard — Columbia Standard — Columbia Electrex

PYRAMIDING DESIGN TALENT



Thin sections, holes, bosses, metal savers, odd shapes all produced in a split second—from molten metal. No other process can compete with this for eye appeal or low cost.

with MADISON-KIPP zinc and aluminum die castings

When product designers send preliminary drawings for critical review by the seasoned Madison-Kipp mechanics, it has often proved to be the decisive factor in the ultimate design of the component parts.

The original designer thoroughly understands the function of his product. We thoroughly understand die casting and machining problems. Combining the two skills at an early period of development is logical and valuable.

Our customers of long standing always utilize this system which virtually pyramids design talent for successful high production manufacturing.

Please clip this ad as a reminder to contact us when you have die casting requirements.

kipp

MADISON-KIPP CORPORATION
213 WAUBESA STREET • MADISON 10, WIS., U.S.A.

• Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools

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There's a Good Reason why ZINC DIE CASTINGS are so widely used

at *Electro-Voice*®

it's

RIGIDITY

Electro-Voice is outstanding in the design, development and manufacture of high-fidelity speakers and components in the field of sound reproduction. Its choice of ZINC Die Castings for these products was based on extensive research and intelligent utilization of valuable properties inherent in ZINC as a die casting alloy.

Replacing materials formerly used, ZINC Die Castings were found to give greatly increased RIGIDITY— an extremely desirable quality when heavy magnets and magnetic assemblies are used, as in the 15TRXB speaker shown above.

Electro-Voice professional quality microphones such as this 664 Cardioid Dynamic have used ZINC Die Castings for several years. Smooth finish, more efficient design and greater impact strength — as well as RIGIDITY— are the reasons for this choice of material.

Notice the ribbed structure of the speaker frame. Here are thin walls and strength where needed—RIGIDITY from every angle. For the Model 635 microphone, these polished die castings incorporate many of the advantages of ZINC, including labor-saving assembly.

Any die caster can show you other examples of improved products and lowered manufacturing costs gained by using ZINC Die Castings. Have you considered whether the same advantages can be incorporated in your products?

THE NEW JERSEY ZINC COMPANY 160 Front Street, New York 38, N. Y.

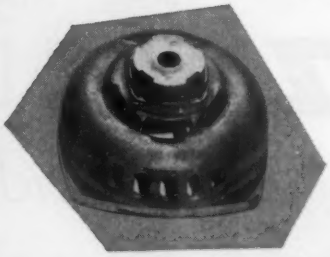
The research was done and the Zamak die casting alloys were developed with

HORSE HEAD SPECIAL (99.99 + % Uniform Quality)

ZINC
FOR DIE CASTING ALLOYS

For more information circle No. 79 on the Reader Service Card

Look at the difference between *ordinary sand casting* and shell molding with Plenco Shell Molding Resins

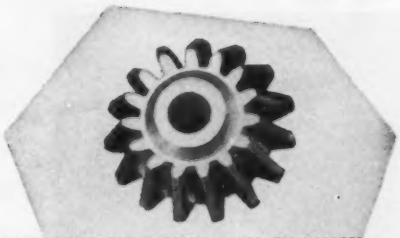


IDENTICAL MOTOR END-FRAMES of gray iron show advantages of shell molding over green sand casting. *Cast frame above* requires reaming, boring, and considerable finishing. *Shell molded frame below* needs only finish reaming in center hole and precision boring on large diameter. Rough and semi-finishing operations have been *eliminated* at both points.

SHELL MOLDING IMPROVES PRODUCTION QUALITY, LOWERS PRODUCTION COSTS

Other advantages of shell molding with top quality Plenco phenolic molding resins include better uniformity and tolerance control from lot to lot. Inspection of incoming products or parts by the end-user frequently becomes a mere formality.

Whatever you are now casting in sand—whether brass plumbing fittings or high strength automatic transmission parts — consult with us about Plenco molding resins to meet *your* need, speed *your* production.



MACHINING THESE TEETH 100% ELIMINATED THROUGH PLENCO SHELL MOLDING

COST CUT 40% IN MACHINING THESE BRONZE BEVEL-TYPE GEARS

2/3 REDUCTION IN AMOUNT OF MATERIAL USED TO CAST THIS MOTOR CYLINDER BLOCK

Serving the plastics industry in the manufacture of high grade phenolic molding compounds, industrial resins and coating resins.

PLASTICS ENGINEERING COMPANY SHEBOYGAN, WISCONSIN

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LETTERS

continued from page 28

qualify will you please add me to your circulation. — M.K.

We are always glad to add qualified readers, especially those who are anxious to continue their education. — Ed.

DIRECTORIES

We understand that you have published a directory issue of manufacturers in the Investment Casting Industry. It is our understanding that this is in Precision Metal Molding for June of this year.

Would you please send us a copy of this issue. — J.H.L. pres.

As long as copies of all of the directories last we always send them to persons having a legitimate interest. — Ed.

GUIDE FOR BUYERS

There is an article appearing on page 38 of the June, 1957 PMM entitled, "Practical Guide For Buyers of Die Castings."

We would like to obtain a half-dozen reprints of this article. If this is possible, kindly forward to the undersigned. — S.W., Office Manager.

This inquiry is typical of many that we have received for reprints and tear sheets of this article. Interestingly enough, most of the requests have come from die casting companies for distribution among their customers. — Ed.

EQUIPMENT

Please furnish us or advise us where we may obtain the recommended analysis for a melting pot which is an integral part of a die casting machine used for casting zinc parts. — F.D.F. Engineering Dept.

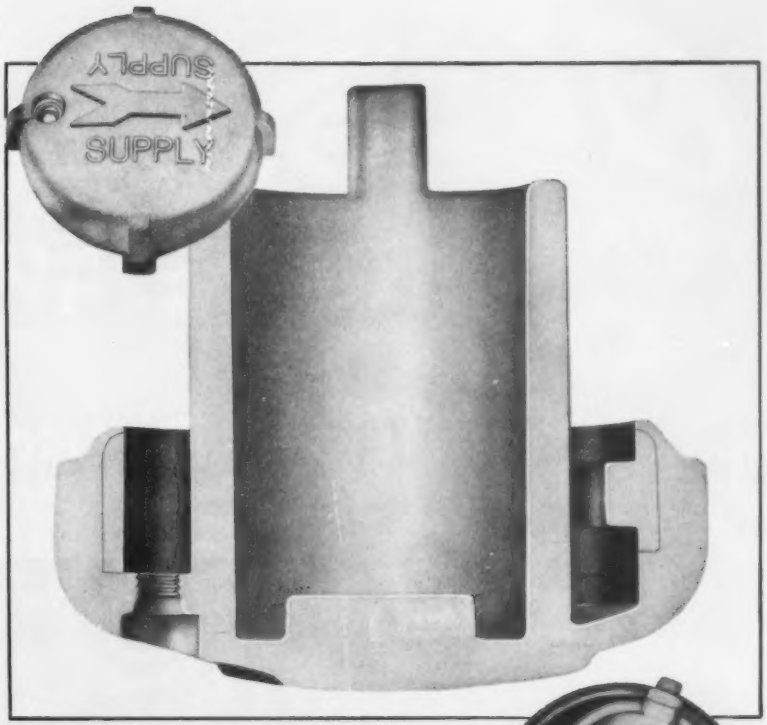
Zinc melting pots are almost always cast iron. Names of companies who can supply them have been sent to F.D.F.

PROCESS INFORMATION

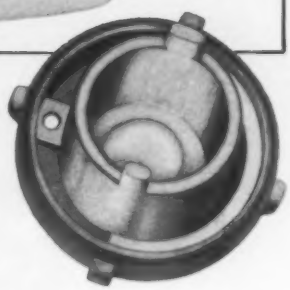
I am interested in securing the March 1956 issue of PRECISION METAL MOLDING magazine which carried the article describing the Shaw process for producing steel mold cavities.

Will you please send me this issue, or tear sheets. — W.G.W., plant mgr.

Tear sheets as well as additional information on the Shaw process has been forwarded. — Ed.



it takes IDEAS to make die casting work for you



Die casting has to be fast on its feet.

When specifications point to die casting because of the accuracy, uniformity, and speed of the process . . . and then some factor goes beyond the normal limitations of die casting . . . *that's* when *ideas* are important!

Ideas *were* important when Twin City Die Castings engineered the dies and cast this cap. A bayonet-type lock called for an undercut.

If ideas are important to your business, write, wire or phone Twin City Die Castings Company the next time you design for die casting. Twin City ideas pay off for many customers, in many ways . . . help everybody to stay fast on their feet.

. . . only DIE CASTING can
✓ cut your costs ✓ offer such flexibility
✓ provide such accuracy

Leading Die Casters in the Upper Midwest

TWIN CITY DIE CASTINGS CO.

3351 TALMADGE AVE. S. E. • MINNEAPOLIS 14, MINN. • PHONE MI 6-7528

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MAKE **DIE-CASTING** THE PROCESS

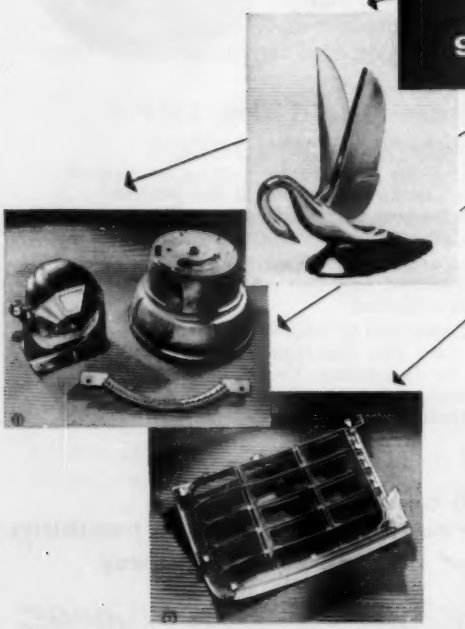
SELECT **ZINC** AS THE BASE METAL

INSIST UPON

BUNKER HILL

THE

99.99+% ZINC



YOU CAN'T GO WRONG on any of these three counts:

DIE-CASTING as the forming method offers numerous mechanical and economic advantages over other methods of manufacture.

ZINC as the base metal produces die-castings with property values superior to those of the other die-casting metals in many categories.

BUNKER HILL, the pioneer and still a leading producer of 99.99+% high purity zinc, provides the die-caster with exceptionally pure zinc, the best available.

The American Zinc Institute, 60 East 42nd Street, New York 17, New York, has available a very interesting 28-page brochure, "Die-Casting-Molten Metal to Finished Part—Direct." We suggest that you send for it. It contains helpful technical information.

SALES OFFICE FOR PACIFIC COAST **THE BUNKER HILL COMPANY** 660 MARKET STREET, SAN FRANCISCO 4, CALIF.

BUNKER HILL 99.99+% ZINC

EASTERN SALES AGENTS **ST. JOSEPH LEAD COMPANY** 250 PARK AVENUE, NEW YORK 17

Even in GREEK ... it's all very clear

A - ALPHA - Absolutely

B - BETA - BEST BY TEST

Γ - GAMMA - Globar's NEW

Δ - DELTA - DELTA elements

... more durable ... more dependable

NOW IT CAN BE TOLD

After two years and hundreds of customer field tests ... Globar's new DELTA Silicon Carbide Heating Elements are unbeatable from *every* consideration. Shortly after Globar engineers perfected the Delta Elements, they were released to the field in restricted quantities and sizes to assure *performance* before public announcement.

Customer reaction speaks for itself:

- Delta Elements outperform *any* competitive element.
- Delta Element operation is more economical ... uniform resistance means fewer tap changes ... longer life ... lower operating costs.
- Delta Element terminals do not overheat, provide trouble-free connections. Elements can be installed in hot furnaces ... minimizes downtime.
- Delta Element resistance characteristic ... low at room temperature ... allows easy periodic operation.
- Delta Elements are available in a wide range of sizes to meet every application requirement ... regular sizes normally available from stock or within two weeks of order. Superior in *performance* and superior in *availability*.

For more information circle No. 27 on the Reader Service Card

TECHNICAL SERVICE AND LITERATURE. *Globar's exclusive service ... a field staff of Electrical Engineers backed by 30 years experience is ready to assist you — without obligation. Technical Bulletin "H" is available upon request. Write Dept. PM 87-715.*

87-715 R

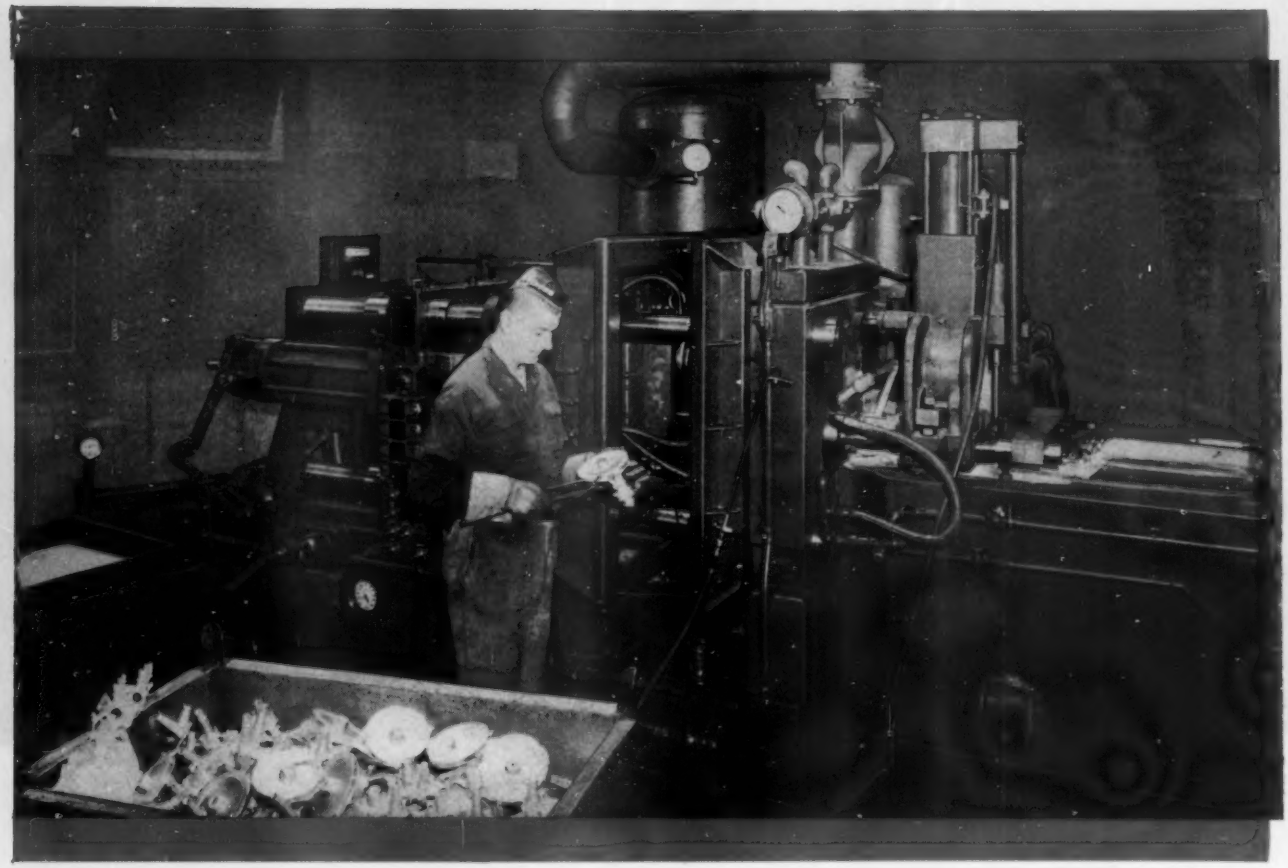
Globar®

DURABLE DELTA DEPENDABLE

DELTA ELECTRIC HEATING ELEMENTS

GLOBAR Division of THE CARBORUNDUM COMPANY, Niagara Falls, New York

REED VACUCAST gives Cleveland Hardware DENSER



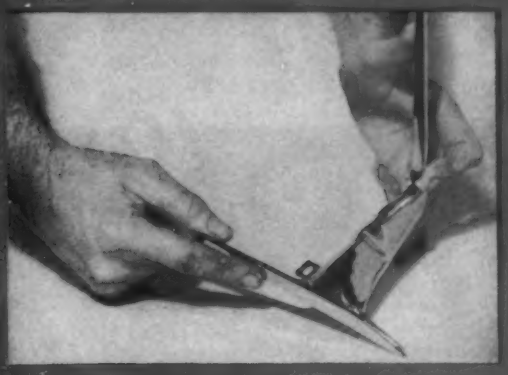
Cleveland Hardware Attributes Order For Portable TV Set Masks Directly To REED Vacucast System

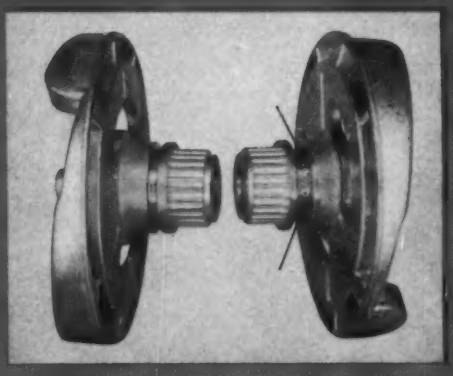
"As a result of being able to reduce wall thickness to .050 of an inch in the zinc casting for a portable TV set mask, we have received a large order," says H. E. White, President of Cleveland Hardware & Forging Company. "This mask could not have been done on a conventional die caster, but with our REED Vacucast machine, we can cast this thin-walled part despite its large area." Cleveland Hardware has also found faster cycles and a vast improvement in the quality of all castings produced on their REED Vacucast.

The REED Vacucast, a vacuum die casting system offered exclusively by Reed-Prentice as original equipment on standard machines, has proven itself in a number of standard production shops. Cleveland Hardware & Forging Company is the latest to find these many advantages in the REED Vacucast:

- Cycling time is 25% faster on some jobs.
- Reject rates have been cut by more than 50% —in some instances 90%.

CASTINGS, IMPROVED FINISH





The photos above show the strength which the REED Vacucast gives to even the thinnest wall castings—flexible enough to bend, yet strong enough to withstand breaking.

◀ Porosity was a problem (right) for Cleveland Hardware in die casting this zinc cam. Now, their REED Vacucast gives them dense castings, cuts reject rates (left).

- Surface finish has been improved, greatly reducing polishing and buffing.
- Less pressure is needed. Many find that a 400-ton machine can replace a conventional 600-ton machine.
- Permissible reduction in wall thickness has meant great savings in metal. Now competes favorably with metal stamping.
- Porosity has been virtually eliminated.
- Improved casting skin and higher density permits higher temperatures for better paint-to-part bond.
- As much as .02" greater skin thickness in thin castings is common.

These are just a few of the many advantages found in the REED Vacucast. To find out how a REED Vacucast can help solve many of the problems you now have in die casting with conventional equipment, mail the coupon here today to Reed-Prentice Corporation, 677 Cambridge Street, Worcester 4, Mass., or contact our nearest sales office.

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New LINDBERG–FISHER Autoladle

Here, for the first time, is a ladling unit that makes automatic casting of aluminum not only possible but practical. The Autoladle has been thoroughly tested and proven in service.

"LITTLE JOE" provides these advantages:

- Adaptable to induction, electric resistance or fuel-fired reverberatory furnaces.
- Ladled metal is withdrawn from beneath surface of bath.
- Precise, accurate control of any size shot up to 30 lbs.
- No interruption of the casting cycle during charging of metal.
- No variation of size of shot due to metal level changes.
- Composed of special refractory materials so arranged that ladled metal cannot come in contact with any metal.

We call it

"LITTLE JOE"

To the best of our knowledge this is the first practical automatic ladling unit yet devised. It will fill an important need in many casting operations. For complete information, get in touch with your nearest Lindberg Field Representative (see your classified phone book) or write direct.

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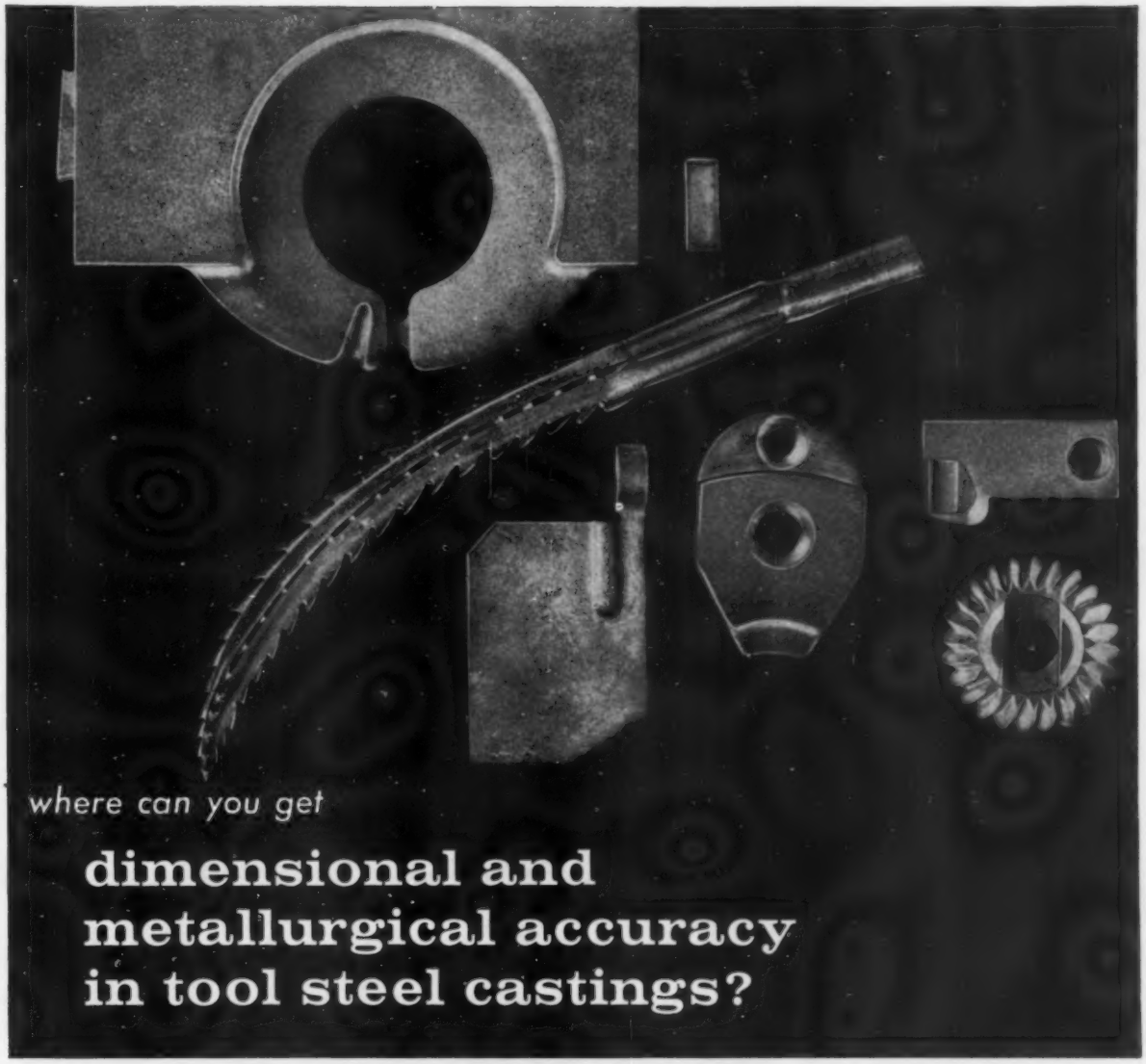

where can you get

dimensional and metallurgical accuracy in tool steel castings?

The quality of tool steel castings depends heavily on metallurgical control and foundry techniques which can be acquired only through long experience in handling tool steels. That's why it will pay you to get your castings directly from Crucible, largest and leading producer of tool steels.

Only Crucible can furnish precision castings in Ketos, Rexalloy, Rex M-2, Rex AA, Airkool, HYCC and Airdi 150—tool steels that solve wear, abrasion and temperature problems when ordinary alloys fail.

Crucible Accumet® Precision Investment Tool Steel Castings are regularly produced with a tolerance of ±.005″ (and even ±.002″ or ±.003″) and a surface finish of 125 RMS to 62 RMS . . . and in almost any shape or configuration.

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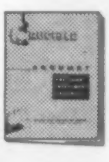
Crucible Accumet Tool Steel Castings can help you reduce costs and improve product performance. Consider Crucible's extensive facilities and experience when you need either investment or sand castings. Write for free booklet to: *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pennsylvania.*



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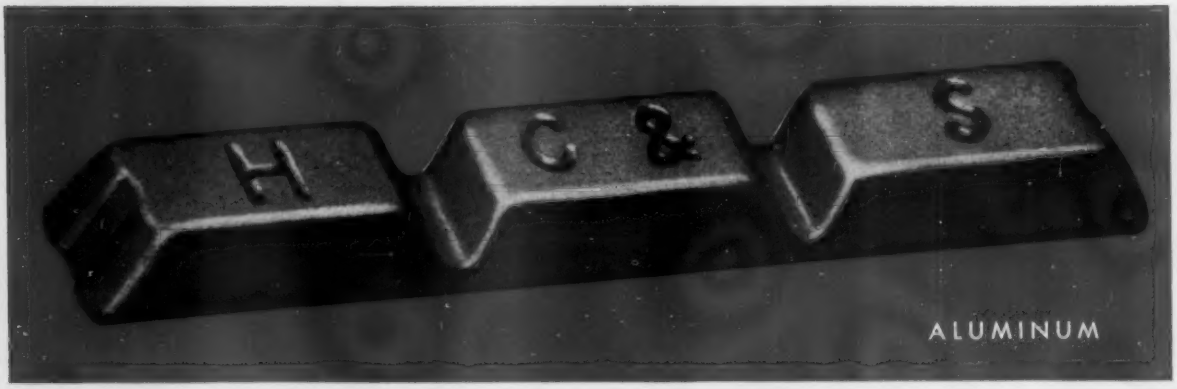

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"THERE'S A REASON FOR OUR ENTHUSIASM . . ."

"Our H-P-M's Give Us Better Quality Castings and Less Scrap . . . Consistently"

Kiowa Corporation, Marshalltown, Iowa, says, "The advanced principles of the H-P-M die casting machines have solved many of our quality problems and our day-to-day die maintenance problems have been reduced. We have two 200 ton, two 600 ton and another 600 ton H-P-M on order."

The new H-P-M die casting machines offer unlimited possibilities for die casting improvements. Here are the reasons: H-P-M's link wedge mold clamp locking mechanism pre-stresses the machine frame so that when metal is injected at high speeds and pressures, the mold is firmly clamped. Frame deflection is minimized due to the "beef" in platen and tie rods. Casting dimensional tolerances and density factors are held; flash is reduced to the minimum; scrap loss is practically nil.

Another important advancement, H-P-M's injection speed control, is infinitely adjustable for acceleration, high speed and pressure follow-through. Intricate detail is accurately reproduced; surface finish is greatly improved; pressure follow-through packs metal for high density.

Remember—for top quality die castings . . . better density control . . . uniform finishes . . . less scrap . . . more year-'round success and satisfaction—H-P-M die casting machines are 'way ahead of the field. Write for Bulletin 5400-J and get the complete facts.

HPM

THE HYDRAULIC PRESS MFG. CO.
Mount Gilead, Ohio, U.S.A.
A DIVISION OF KOEHRING COMPANY

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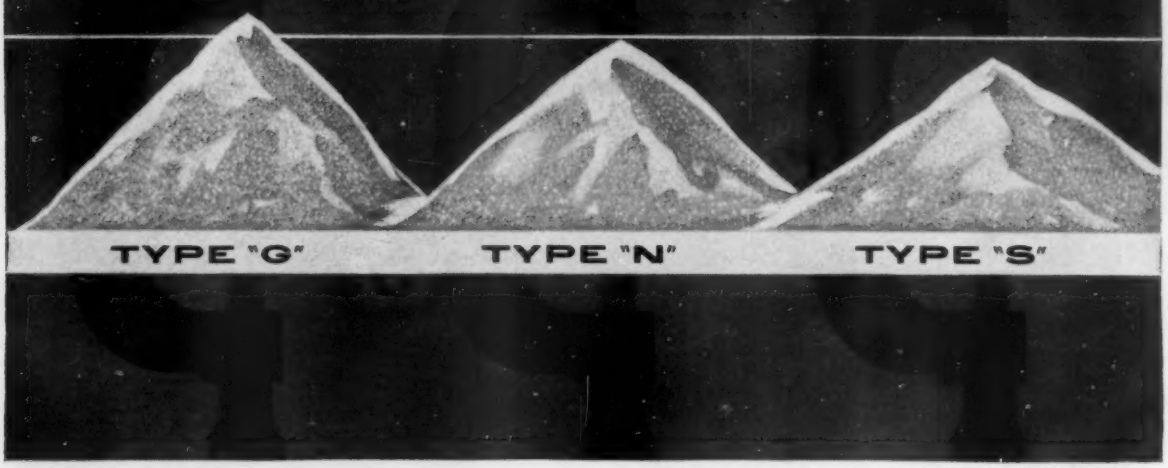
REPUBLIC IRON POWDERS *with* cdf



give you predictable dimensional characteristics after sintering

Now, for the first time, you can accurately predict what the dimensional characteristics of iron powder will be after sintering operations. You can eliminate the element of uncertainty in powder reaction, before a part or tool is designed, before a production run is started.

This major development is the result of Republic's exclusive *Controlled Dimensional Factor* process of manufacturing iron powder.

CDF means that in the presence of copper, Republic Iron Powder—depending on type—can be made to grow, shrink, or remain stable within acceptable tolerance limits. The powders have been designated as:

TYPE "G" FOR GROWTH—A powder having a definite growth characteristic in the presence of copper. It was developed for use in many *existing* dies designed for powder which expands when sintered.

TYPE "N" FOR NORMAL—This powder has been given normal variation in dimensional change from slight shrinkage to slight growth, depending upon the end result required.

TYPE "S" FOR SHRINKAGE—A powder with an extremely high shrinkage characteristic which can be used to attain certain tensile strengths with lesser quantities of copper.

CDF provides definite benefits for everyone concerned with the design and fabrication of iron powder sinterings. Consistently uniform shrinkage and growth values aid the design engineer in establishing final dimensions of parts. Tool engineers can design tools to part print dimensions with the assurance that tolerances, transverse to the direction of pressing, can be held within ± .001 inches per inch. Fabricators can produce consistently uniform sinterings at faster rates and at minimum cost.

Republic Booklet Adv-763 contains complete information on test evaluations, chemical composition, and physical properties. Mail the coupon for your copy; or for obligation-free metallurgical service.

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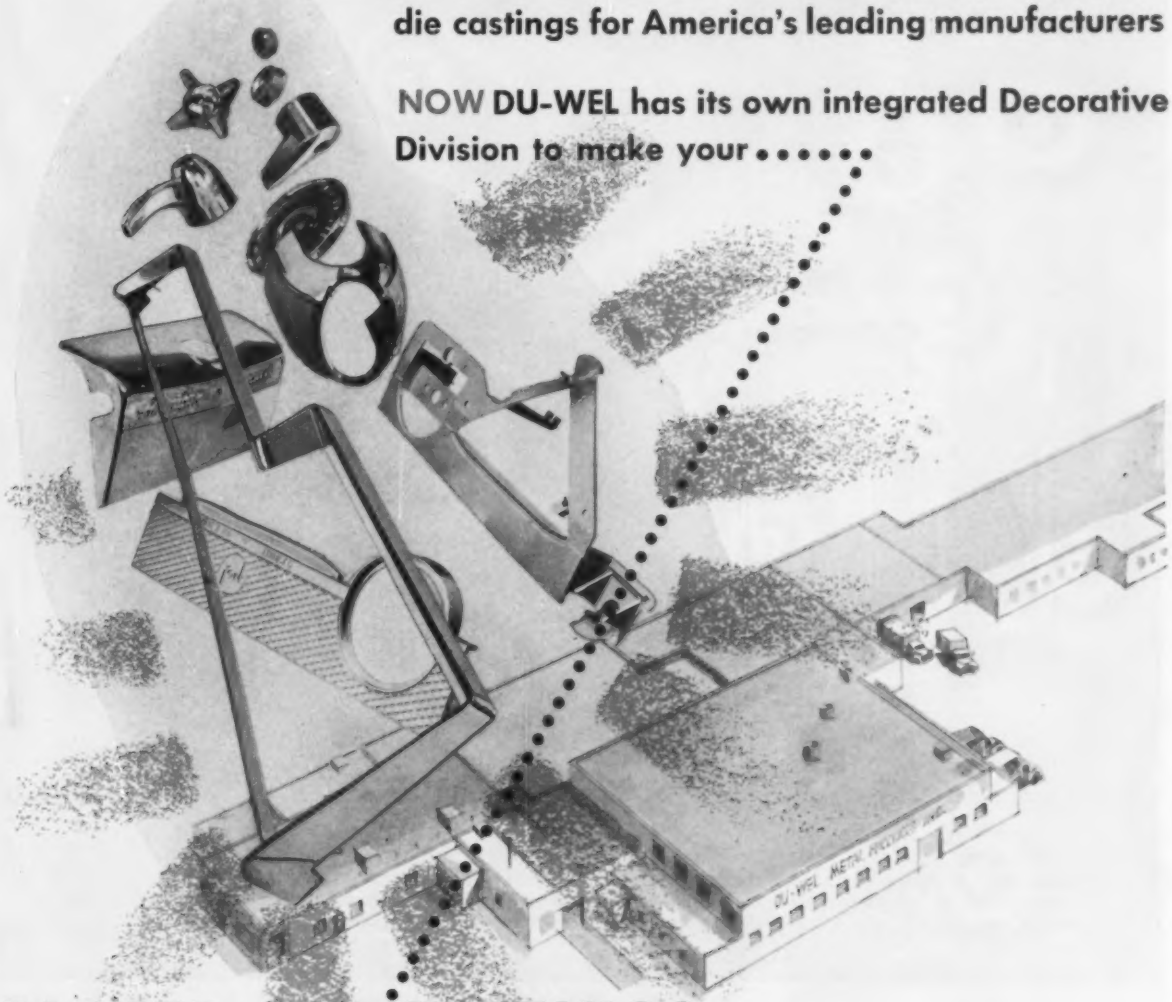
For 11 years **DU-WEL has made top quality, fully machined die castings for America's leading manufacturers**

NOW DU-WEL has its own integrated Decorative Division to make your.....



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FULL RESPONSIBILITY, from tooling all the way through to completely finished die castings including complete assembly, can be placed in one source. With all die casting, machining, plating and painting integrated by a modern conveyor system, you get the maximum in service, quality and economy under one roof.

IT WILL PAY YOU to let us quote on your die casting requirements. For more than a decade we have been meeting the quality standards of many of America's largest manufacturers of appliances, automotive equipment and other products.

Send your inquiries to

DU-WEL METAL PRODUCTS, INC.

BANGOR, MICHIGAN

Representatives in Detroit, Mich., Jackson, Mich., Chicago, Ill., Milwaukee, Wisc., Dayton, Ohio, Ft. Wayne, Ind., Evansville, Ind., Pittsburgh, Pa.

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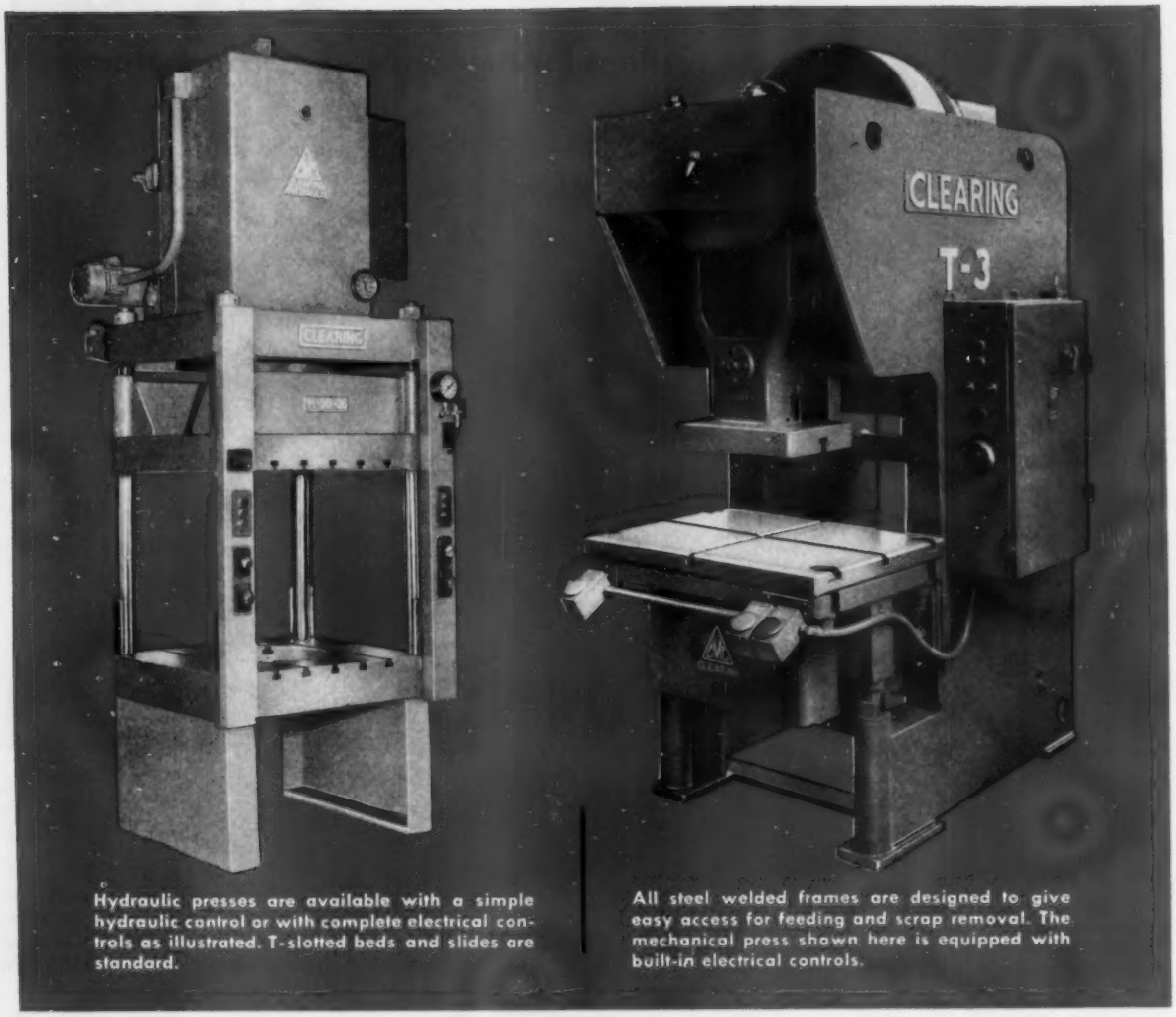

Hydraulic presses are available with a simple hydraulic control or with complete electrical controls as illustrated. T-slotted beds and slides are standard.

All steel welded frames are designed to give easy access for feeding and scrap removal. The mechanical press shown here is equipped with built-in electrical controls.

Give Costs a TRIMMING with NEW CLEARING FLASH TRIMMING PRESSES

Generous bed sizes, ample clearances for feeding and unloading, low initial costs, high speeds—these are the features you'll find in Clearing trimming presses. These presses are available in gap-type mechanical models and in column and gap-type hydraulic models. Capacities range from 30 to 75 tons.

Clearing trimming presses are readily portable by lift truck or crane. When controls are specified, they are built right into the press so that moving the machine from one place to another is greatly simplified. Controls available on these machines may be as simple or as elaborate as you wish. Machines will be furnished without accessories or with deluxe controls which can include "electric eye" safety devices that stop the press if the beam is interfered with.

If you have been tying up standard punch presses for trimming work, it will pay you to investigate the advantages of presses which are specifically designed to simplify and speed up your flash trimming operations. Write or call on Clearing for more detailed information.

CLEARING PRESSES THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION *division of* **U. S. INDUSTRIES, INC.**

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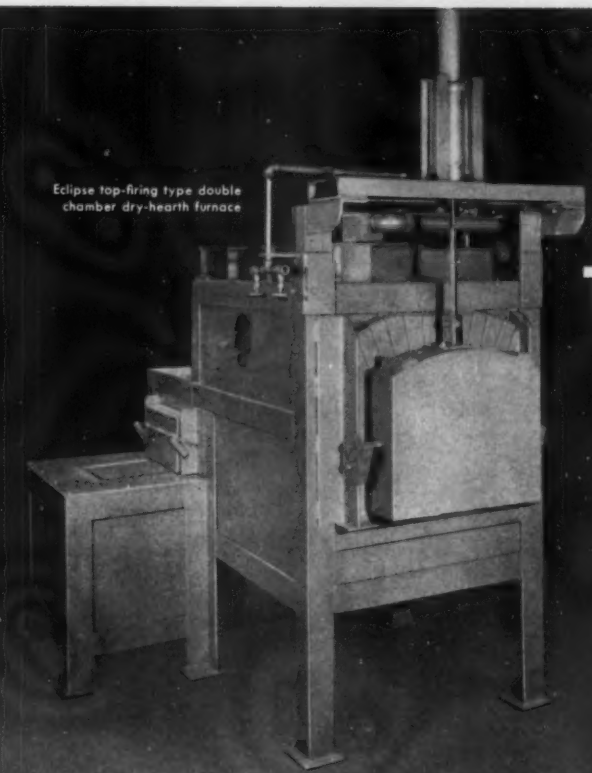
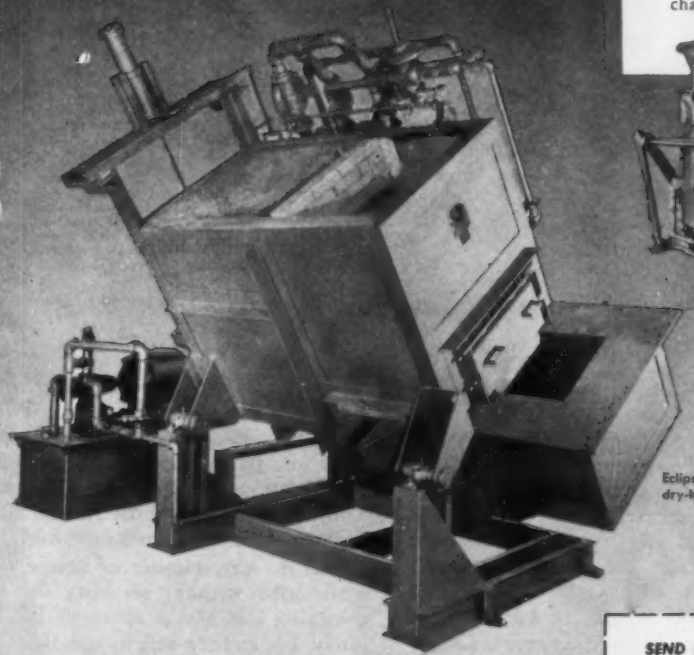
Few melting cost factors are more important than

THE FIT OF THE FURNACE

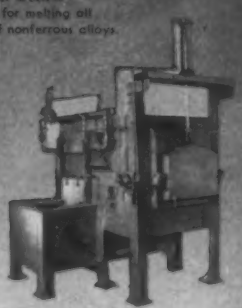
Eclipse top-firing type double chamber dry-hearth furnace



Our experience proves that the *fit* of the melting furnace — the way its design features mesh with the rest of your operation — is a *major* factor in the size of your net profit. That's why efficient Eclipse crucible and double chamber dry-hearth furnaces are offered *in such a wide variety of firing, loading, pouring, and dipout arrangements*. And each furnace is available in *a range of sizes bracketing practically all logical users* of any given type. In short, you easily select the Eclipse furnace you need for your plant arrangement, space requirements, personnel, production rate, etc., just as if you had designed it yourself! How closely have you considered this approach to cost-cutting? Discuss your furnace *fitting* problem with the highly experienced Eclipse representative . . . especially if your operation has grown or changed in recent years.



Eclipse hydraulic tilting nose-pour crucible furnace for melting all types of nonferrous alloys.



Eclipse side-firing double chamber dry-hearth furnace

Eclipse hydraulic-tilting double chamber dry-hearth furnace

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SEND new Bulletin C, illustrating and describing 9 Eclipse crucible and double chamber dry-hearth furnaces that offer custom-design efficiency for most metal-melting operations.

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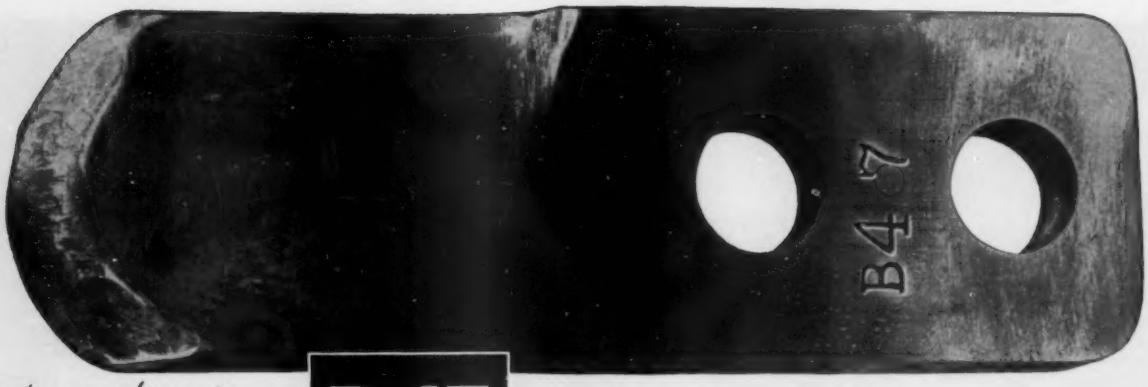

This punch gave double service!

B-47 HOT WORK STEEL

gives you more runs for your money

...anywhere from 1½ to 5 times the Performance!

This block had double life!

This die lasted 50% longer!

SOME TYPICAL EXAMPLES

B-47 dummy blocks, vs. 9% and 12% tungsten types, extruded more than twice as many brass and copper tubes. B-47 dies outperformed 12% tungsten type 1¼ to 1.

B-47 punches, vs. low-carbon 18-4-1 type, hot pierced more than twice as many eyes in steel axes. See top picture.

B-47 die inserts, vs. 9% tungsten types, hot pressed more than twice as many steel side gear forgings. B-47 die inserts, vs. regular insert material, performed better than 5 to 1.

B-47 dummy blocks, vs. 5% tungsten-5% chromium types, extruded twice as many copper and brass tubes and rods. B-47 dies outperformed 12% tungsten-12% chromium type.

B-47 punches, vs. 5% chromium type, hot extrusion forged 1½ times as many automotive steel front axle spindles.

B-47 die inserts, vs. 9% tungsten types, extruded 1½ times as many high alloy steel automotive valves. This is considered a very difficult job for any grade of hot work steel.

SEND NOW

for "Blue Sheet" on Grade B-47

This four-page folder gives technical data on B-47 for brass extrusion dummy block and dies, valve extrusion die inserts, hot punch tools, forging die inserts, press forging dies, and hot work in general. *Write for your copy today.*

ADDRESS DEPT. PM-93

Looking for a better hot work steel? You'll find it in B-47—an improved chromium, tungsten, cobalt, vanadium type whose superiority is established by actual performance runs such as those summarized above. All tests show that B-47 has unusual resistance to shock and abrasion at elevated temperatures.

Developed originally for applications in the copper and brass industry, B-47 has given excellent results on difficult hot work jobs on steel. B-47, when properly heat treated, exhibits a well rounded combination of red hardness, toughness, and resistance to wear and heat checking that makes it a valuable addition to the Allegheny Ludlum group of hot die steels.

Put B-47 to the test. You'll find that it will do any number of severe hot work jobs without washing out or changing size. Get in touch with A-L, today. Let us help you to use B-47.

• *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

For complete **MODERN** Tooling, call

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60,000 SQUARE FEET
OF MODERN FACILITIES
NEW ENGLAND DIE CASTING COMPANY
445-500 FRONT AVE., WEST HAVEN, CONNECTICUT

NE
Everything that adds up to the finest in modern die casting . . .
NEW ENGLAND DIE CASTING CO.
WEST HAVEN, CONN.

In 1957 the die casting industry continued its growth. There was some slow down, but in general the industry and the suppliers to the industry were healthy.

1958? Growth and New Markets

54 1958?—A FORECAST BY USERS OF DIE CASTINGS

A survey among users and potential users of die castings has shown that many new products will be designed to be made as die castings. Established uses will continue at an accelerated level. Aluminum is favored for new products, but will not replace zinc in existing applications.

56 1958?—THE FORECAST FOR FINISHING

There will be little difference in the types of machining or surface finishing done on die castings. A great majority of the castings will have simple machining done on them. Paint and lacquer will be the most widely used, followed by chromium plating.

58 1958?—HERE'S WHAT THE CASTING PRODUCERS THINK

General business conditions will remain good. Aluminum will show a more rapid rise than zinc, but there will be no marked replacement. The trend toward larger, more complex castings will continue.

60 1958?—TECHNICAL ADVANCES LEAD TO NEW USES, LOWER COSTS

Research and development work continues apace in the die casting industry. New die making methods, new alloys, new finishes and new refractories are only a few of the coming factors that will lead to broader uses of die castings.

62 1958?—METAL SALES WILL EXPAND

Aluminum, magnesium and zinc will all show a marked increase in consumption. New products, new alloys, and generally high production levels will all contribute.

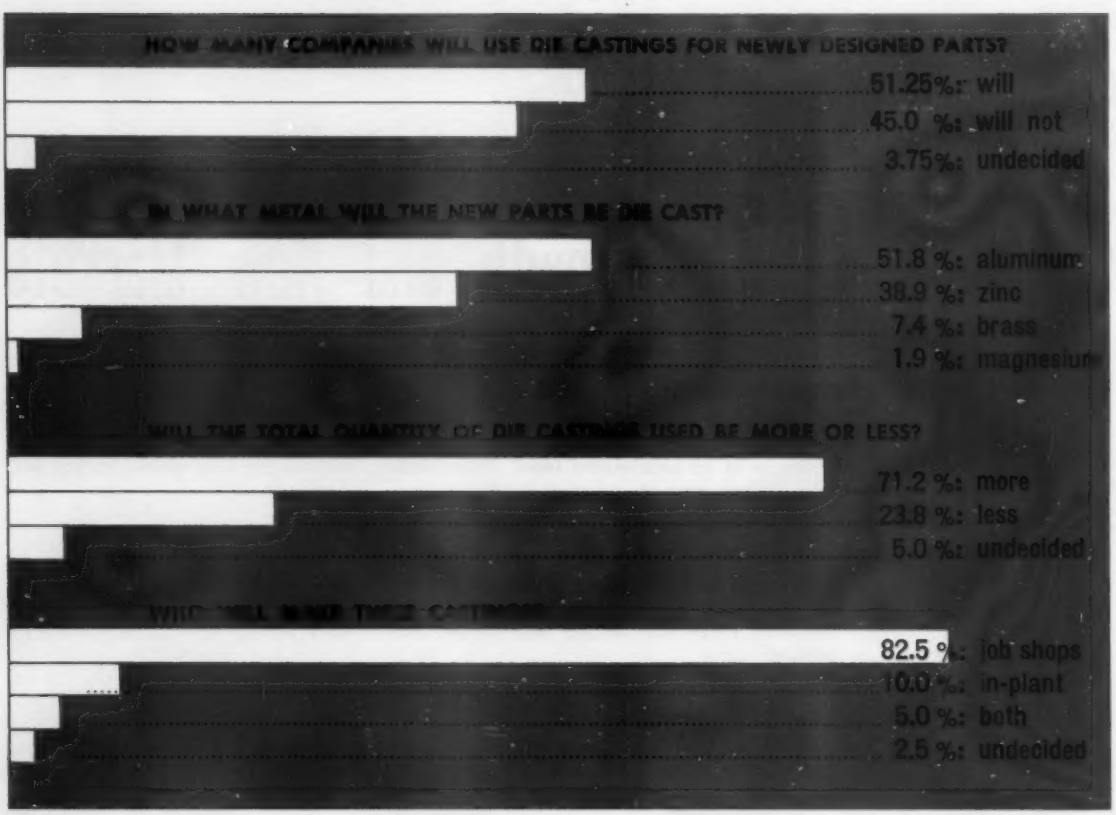
64 1958?—HOW ABOUT MACHINE SALES

There has been a slight slackening off in machine sales that will probably continue into 1958. Indications are for the heaviest sales in very small and quite large machines. Hydraulic fluid sales continue to boom.

PMM **DIE CASTING FORECAST ISSUE**

Will the die casting industry continue

1958? — A FORECAST BY


HOW MANY COMPANIES WILL USE DIE CASTINGS FOR NEWLY DESIGNED PARTS?
51.25%: will
45.0 %: will not
3.75%: undecided
IN WHAT METAL WILL THE NEW PARTS BE DIE CAST?
51.8 %: aluminum
38.9 %: zinc
7.4 %: brass
1.9 %: magnesium
WILL THE TOTAL QUANTITY OF DIE CASTINGS USED BE MORE OR LESS?
71.2 %: more
23.8 %: less
5.0 %: undecided
82.5 %: job shops
10.0 %: in-plant
5.0 %: both
2.5 %: undecided

WHAT DOES NEXT YEAR HOLD FOR THE DIE CASTING INDUSTRY?

To find the answer, PRECISION METAL MOLDING asked its readers for an estimate of their 1958 plans. Briefly, the answers added up to a greater use of die castings than ever before. Aluminum will have a slight preference over zinc unless there is a large swing to zinc among the companies who are still undecided as to what metal they will use.

Most companies who reported, whether they plan to die cast parts never so cast, or not, estimate that they will use more die castings in 1958.

Further, a very strong majority will buy their castings from jobbing die casters. A few will operate inplant facilities only, and another small group will utilize both sources.

These facts, briefly stated above, are shown graphically in the bar charts. A break-down of the figures from which these charts were made indicates where new business will be found in 1958, and where there will be an increase in the use of die castings. For convenience standard industrial classification breakdown has been employed. (See page 57 for a description of these classifications.)

to grow—where are the probable markets?

USERS OF DIE CASTINGS

THESE ARE THE PROBABLE NEW MARKETS						
SIC Classification*	34	35	36	37	38	39
Will use new castings	37.5%	33.3%	66.7%	28.6%	91.7%	50.0%
Will not use new castings	56.2	48.2	25.0	71.4	8.3	33.3
Not yet determined	6.3	18.5	8.3	0.0	0.0	16.7
Casting will be in						
Aluminum	37.5	37.1	66.7	57.1	83.3	50.0
Brass	12.5	3.7	0.0	0.0	0.0	16.7
Magnesium	0.0	7.4	8.3	0.0	0.0	16.7
Zinc	25.0	37.1	50.0	14.6	50.0	33.3
Not decided	50.0	48.7	25.0	25.4	0.0	33.3
Will use more castings	56.2	66.7	91.7	42.9	91.7	67.7
Will use less castings	6.3	18.5	0.0	28.6	0.0	33.3
Not yet estimated	37.5	14.8	8.3	28.6	8.3	
Will buy from job shop	81.3	95.4	83.3	100.0	83.3	83.3
Will make in plant	25.0	18.5	16.7	0.0	16.6	16.6
Will machine castings	87.5	88.9	83.3	100.0	83.3	100.0
Will not machine castings	12.5	11.1	16.7	0.0	16.6	0.0
Will surface finish castings	81.25	74.1	83.3	57.1	66.7	100.0
Will not surface finish castings	18.75	22.2	16.7	28.6	8.3	0.0
Not yet determined	0.00	3.7	0.00	14.3	25.0	0.00

*SIC — *Standard Industrial Classification* *see page 56*

From the table developed from the data collected, it would seem that the year 1958 should show an ever-increasing use of die castings at about the same rate, or perhaps a slightly greater rate, than has been evident in the past. There will be some readjustment of markets, particularly in the transportation industry where there is likely to be a decline in the use of die cast parts.

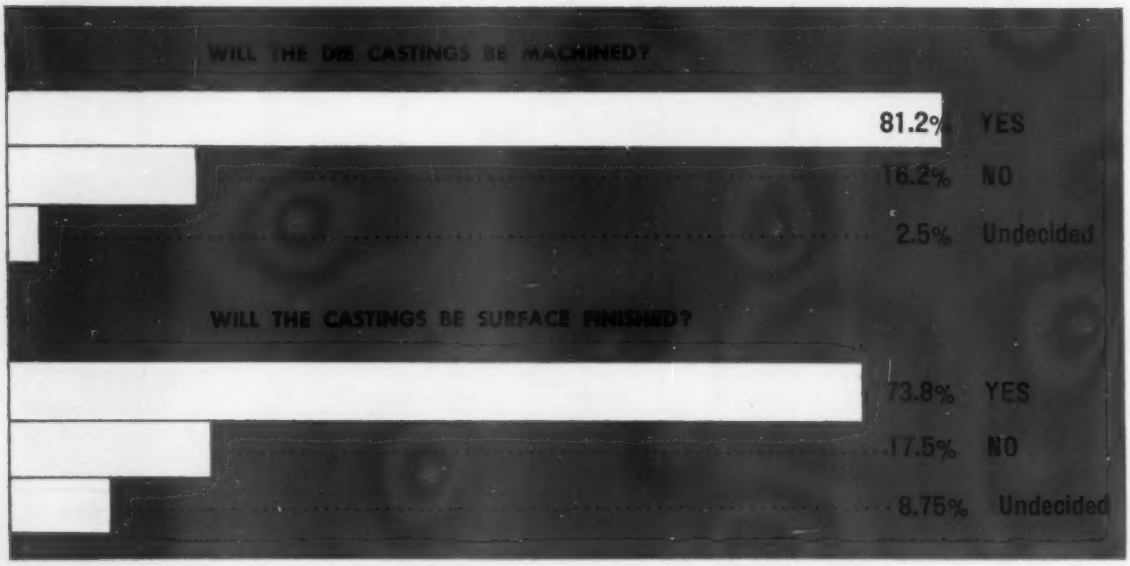
Whether or not the above forecast for 1958 will be fulfilled, remains to be seen. But based upon the best evidence available at the present time, it would appear that manufacturing industries coming under SIC classification 36 will show the greatest usage of die castings. The reason for this may be obvious, since the manufacturing industries in this classification include electrical appliances, generating and transmitting equipment, and communications equipment, all of which are high-volume industries.

This applies only to anticipated new design. When the probable "best markets" for total use of die castings are considered, a close second is found in the general machinery industry.

The die caster should, therefore, look for increased business in the year 1958.

1958? — The Forecast For Finishing

The increased use of die castings will reduce expensive machining and surface finishing.



IN the data furnished by the users of die castings, information was given indicating how much machining and surface finishing will probably be done on castings used next year.

Under the general heading of finishing operations is included everything done to the castings after the initial rough-trimming following casting. This can include some assembly operations, particularly subassembly prior to further machining or surface finishing.

While the data show that a very large majority of the castings will be machined and surface finished, they show also that the machining will be of the very simplest type and much of the surface finishing will be by painting or laquering only.

A study of the operations that will be done by the individual industrial groups is revealing. As in previous reports of this study, standard industrial classifications are used to break down the information by industrial groups.

These standard industrial classifications are:

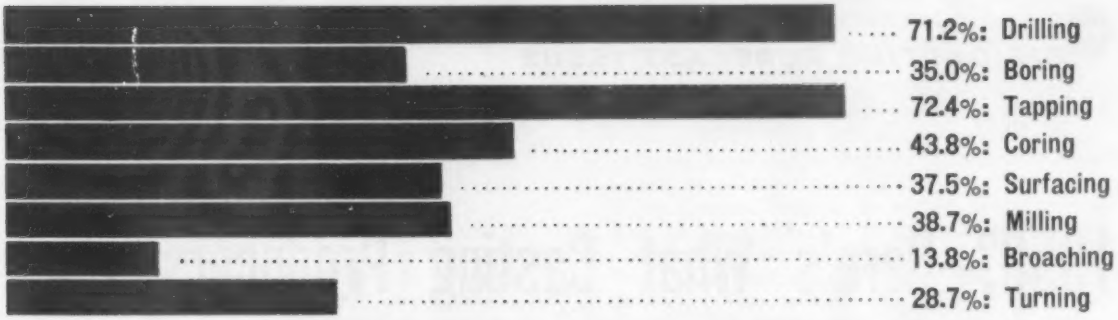
CLASSIFICATION 34 — FABRICATED METAL PRODUCTS: Cutlery, hardware, heating apparatus, lighting fixtures and tools.

CLASSIFICATION 35 — MACHINERY (EXCEPT ELECTRICAL): Engines, agricultural, construction, mining, special industry, metal working, general industry, office and store, service industries and household.

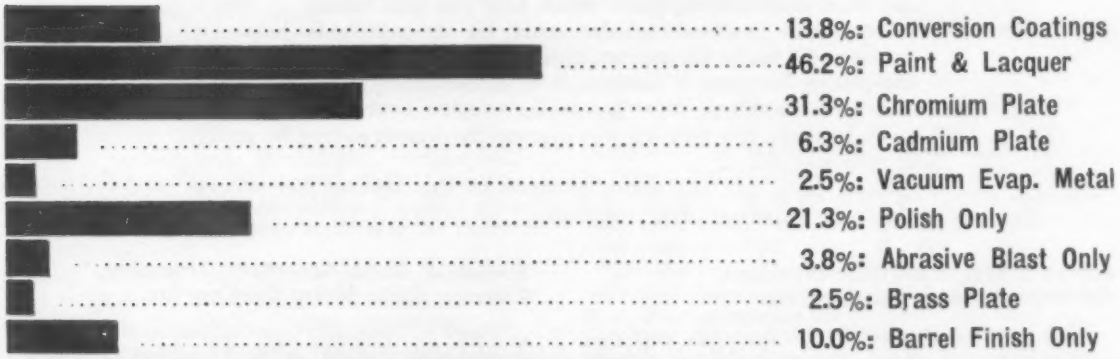
CLASSIFICATION 36 — ELECTRICAL EQUIPMENT, MACHINERY AND SUPPLIES: Generating, transmitting, distributing, appliances, electrical equipment for autos, aircraft and communications.

CLASSIFICATION 37 — TRANSPORTATION

WHAT SURFACE FINISHING OPERATIONS WILL BE DONE?



WHAT MACHINING OPERATIONS WILL BE DONE?



FINISHING OPERATIONS						
SIC Classification	34	35	36	37	38	39
Drilling	68.6	74.3	66.5	71.5	66.5	67.7
Boring	18.7	51.8	25.0	28.6	41.5	33.3
Tapping	75.0	66.7	75.0	57.2	83.2	67.7
Reaming	31.2	40.8	50.0	28.6	58.3	67.7
Surfacing	50.0	40.8	33.3	14.3	41.5	50.0
Milling	25.0	48.2	33.3	28.6	50.0	33.3
Broaching	25.0	7.4	8.4	28.6	16.7	0.0
Turning	31.2	29.6	25.0	28.6	16.7	33.3
Conversion Coatings	18.7	3.7	41.6	14.3	0.0	16.7
Paint & Lacquer	50.0	44.4	58.4	57.1	33.3	50.0
Chromium plating	37.6	33.3	25.0	28.6	25.0	16.7
Cadmium plating	6.2	7.4	16.7	0.0	8.4	16.7
Vacuum Evaporation	0.0	0.0	0.0	0.0	0.0	33.3
Polish only	43.7	14.8	8.5	0.0	33.3	16.7
Abrasive blast	0.0	0.0	0.0	0.0	16.7	16.7
Brass plate	12.5	0.0	0.0	0.0	0.0	0.0
Barrel finishing	6.3	3.7	0.0	0.0	16.7	66.7

EQUIPMENT: Motor vehicles, aircraft, ship building, railroads, cycles, equipment and parts.

CLASSIFICATION 38 — PROFESSIONAL, SCIENTIFIC AND CONTROLLING INSTRUMENTS: Photographic and optical goods, watches and clocks.

CLASSIFICATION 39 — MISCELLANEOUS MANUFACTURING INDUSTRIES: Musical instruments, toys, sporting goods, jewelry, etc.

From the table, it is immediately evident that only the simpler machining operations, such as drilling, tapping, reaming and surfacing will be done in any appreciable number of cases. This, of course, only emphasizes the reason for the use of die cast parts — the reduction in machining.

Surface finishing will, as always, be predominately the application of paint and lacquer, with chromium plating and conversion chemical coating being next most often used.

In interpreting the data in the table bearing on surface finishing, it should be remembered that the percentage figures given for conversion coatings represent only those cases where no further operation is done. It is safe to assume that in the majority of cases where either paint or lacquer is applied to a casting, some type of chemical conversion coating is given first.

Care should also be exercised in using the data given for barrel finishing. The figures reported are only those where this method is used exclusively. Not shown in the table are the tremendous numbers of die castings that are barrel finished for deburring, radiusing, and similar operations prior to some other finishing operation.

Obviously, all of the products covered by the various classifications fall within the category of mass-produced items. It is natural, therefore, to find a very high degree of mechanization in the surface finishing operations employed. A report on these highly automated finishing systems will be found in this issue beginning on page 75.

1958?--Here's What Casting Producers Think

It just isn't feasible to wait until business comes to your door and then start making plans about how you will handle it. Every businessman realizes that he must try to anticipate business trends to be ready for any anticipated changes or major shifts. The die casting business is no exception. If the trend is to be toward ever larger castings, then the producer must have the equipment to make them. If a new alloy is coming, the foundry must be ready to melt and cast it.

Here, then, are the views of some of the leading die casters about the future of their industry.

Alfred Schneier, Jr., Vice President, Advance Pressure Castings, Inc.

"It is our opinion that the forthcoming year will show a wide and varied increase in the use of both zinc and aluminum alloy die castings. We do not expect any major replacement of zinc alloy by aluminum and we expect the trend towards larger castings to continue.

"It is our firm belief that there are untold fields for both zinc and aluminum alloy die castings yet to be tapped. The advent of the vacuum die casting process is being watched with consuming interest by the entire industry. While it appears, at this date, somewhat premature to forecast the effect on the industry, the fact that it is being watched and studied so closely indicates the die caster's willingness and anxiety to improve his product."

Ralph D. Ferguson, Foundry Manager, Bendix Foundries.

"We definitely foresee an increase in the use of die castings and we feel that the major increase will take place in aluminum and magnesium. We expect aluminum to replace zinc, especially if anodizing is successful.

"Vacuum die casting is something that is badly needed for extremely high quality castings. At present, we do not feel that the art has been developed to the point where it can be used successfully on all types of castings.

"Present indications are that an aluminum alloy which can be both die cast and anodized will be developed within the next 12 to 18 months. The metal suppliers can do a service to the industry by developing aluminum alloys that can be plated and anodized easily and by continued research for special purpose alloys.

"We feel the greatest increase in the use of die castings may come in automotive and aircraft fields."

Samuel A. Gullo, Secretary, Treasurer, Chicago White Metal Casting, Inc.

"There will probably be a decrease in the use of die castings with no significant shift from one metal to any other. Vacuum die is still in its infancy so that it is not possible to properly evaluate it at this time.

"The present trend toward larger die castings will probably continue.

"An anodized and die castable aluminum alloy will probably be developed and become commercially available within the next five years.

"We expect some increase in the use of die castings in the automotive and business machines industries and a possible decrease in the appliance industry."

S. D. Gunning, General Sales Manager, H. K. Porter Company, Cleveland Div.

"We anticipate an increase in the use of die castings with most of the increase going to aluminum; we further expect that aluminum will largely replace zinc.

"It is highly probable that vacuum die casting will take over about 60 percent of the market and that a die castable and anodizable aluminum alloy will soon be commercially available.

"Notable increases in the use of die castings will probably come in the automotive industries with no notable decreases in any general industrial group."

Philip Dollin, Assistant to the President, Dollin Corp.

"I believe the die casting industry as a whole, can look forward to continued growth. However, the outlook for individual firms within the industry is much less secure and depends on each firm's ability to control costs and develop new equipment to maintain a competitive edge.

"There will probably be no major change in the

proportion of sales between zinc and aluminum. The greatest growth will come outside of the automotive field, that is, in small appliances, cameras, tools, etc."

Carl Roehri, President, Federal Die Casting Co.

"We definitely look for a good increase of all types of die castings for the coming year and beyond. Both zinc and aluminum will share in this increase, the choice being dictated by both speed of production and the market price of metals.

"There may be some increase in die casting use in the automotive field. One interesting point is that with air conditioning the windows could be fixed and the feasibility of die cast doors could be considered. In the fields of radio, television and phonographs other materials seem destined to replace die castings."

R. C. Cornell, Vice President, Litemetal Dicast, Inc.

"I do not expect a drastic shift from zinc to aluminum in the near future. Zinc is still hard to beat on platability. The current frenzy of interest in vacuum venting for die casting has good and bad aspects. I believe that, intrinsically, vacuum will ultimately be the key to the solution to many of the problems that plague die casters. Practical vacuum die casting of aluminum appears to be further away than for zinc.

"Many problems, both metallurgical and mechanical must be solved before we can dependably anodize aluminum die castings for decorative coloring.

"Vacuum may also be an important key to very large die castings. Presently, high machine costs and die making and maintenance expenses stand in the way of widespread usage of very large die castings."

Lewis P. Held, Vice President, Mt. Vernon Die Casting Corp.

"While we do not expect to see any major replacement of one metal by another, we do expect a larger growth in aluminum than in zinc. This will accompany a steady increase in the use of die castings. Along with this, the trend toward larger die castings will continue for the next several years. Probably the greatest gains, as measured by use of die castings, will come in the industries manufacturing portable tools and office machines.

"In our opinion, vacuum die casting will become just another tool for the die caster to use. There will be certain jobs that are more feasible to run in vacuum than by conventional methods. Therefore, vacuum will be an adjunct to the jobbing die caster."

A. F. Bauer, Chief Engineer, Doehler-Jarvis Div., National Lead Co.

"The trend today is toward bigger and more complex castings. Castings in aluminum weighing up to 75 lbs. and in zinc weighing up to 200 lbs. are possible today. Many of the large aluminum castings are going into automobiles, but others are finding applications in the field of office machines, household appliances, electric motors, air conditioners, compressors and in television.

"Most of the large castings are in aluminum and are 'beating-out' gray cast iron by virtue of their light weight and their excellent fatigue strength."

Chas. W. Ohse, President, The New England Die Casting Co., Inc.

"As our daily activities are becoming more dependent upon mechanical devices, and as industry becomes more aware of the fact that die castings are a practical answer to many of its problems, a tremendous increase must result. That this increase will be most evident in aluminum alloys is certain and has been in startling evidence for the past three or four years. While there will be little shift in metal for existing parts, indications are that new applications will be primarily in aluminum.

"In my opinion, vacuum die casting is the answer to most of the problems confronting both producer and user of die castings.

"The size of castings, except in unusual or isolated cases, will not increase due to the time element needed for die construction. Our constant design changes would, in most instances, obsolete the item before tool completion."

Gordon C. Curry, General Sales Manager, Precision Castings Co.

"There is no doubt in my mind that there will be an increase in the use of die castings. While there will probably be no major replacement of zinc by aluminum, I do think that the use of aluminum will increase a little faster than zinc. However, a lot of work is being done on stamped aluminum grilles that may replace the former zinc die cast grilles that were chrome plated.

"The future of the industry depends a lot upon the sound development of the use of die castings. Most of the companies are trying to do a sincere job, but there are some, without the proper experience, who are promising tolerances and performance which are beyond the scope of die castings. It is up to each member of the industry to investigate thoroughly the design and specifications of new jobs so that the whole industry will not be given a black eye."

Joseph Saks, Director of Sales, Gries Reproducer Corp.

"So far as we are concerned, we definitely see a continued increase in the use of die castings. Our output has been growing constantly and we definitely look forward to substantial gains this year, and for at least several more years to come. The use of die castings as a whole, I think it will be increasing.

"I believe the greatest growth in the use of die castings will be in the electrical, electronic and appliance industries. I know of no industry that I think will decrease its use of die castings, except perhaps automotive.

"Based on our own experience, I think that the use of small and tiny die castings will become an ever greater factor in industry. There are far more industries, trades and end products that can use such small die castings than there are for large die castings. I have no question at all about this in terms of numbers of parts, and also feel that in a matter of a few years the tonnage will be important."

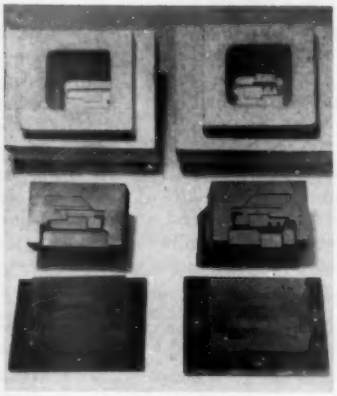
H. H. Doehler, National Lead Co.

"In the next ten years the die casting industry will grow from the present annual output of $250 million into a billion dollar industry.

"History records that certain ages have shaped man's progress: they are known as the Stone Age, Iron Age and the present Steel Age. The next Age might become known as the 'Light Metal Age' in which aluminum and magnesium, in conjunction with the die casting process, will be the dominating factor."

PMM FORECAST

THESE ARE SOME TECHNICAL DEVELOPMENTS



CAST DIES that lower cost of tooling are getting the ultimate test of actual production runs by several die casters.

REFRACTORY material to resist molten aluminum cuts down-time . . . is typical of improved process materials in use.

1958? Technical

POTENTIAL for increased usage of die castings depends, to a large extent, upon new technical developments which improve the properties or finishability, or reduce the cost of the castings. In the offing are many new materials and processes which may hold the key to these advances.

Some of the new developments are actually in full production, while others are only in the preliminary stages of experiment or pilot operation. No one of them, by itself, can be expected to unlock the floodgates of new uses for die castings, but taken together, they represent many new inducements for designers and buyers to call for more die castings in their products.

Here are a few of the interesting developments you should watch . . .

NEW ALLOYS Work has been under way for some time on alloys of zinc and aluminum which have a higher range of physical properties than the present standard alloys. Recently announced (PMM March 1957) was a castable, high-strength aluminum alloy giving 46,000 psi ultimate tensile and 36,000 tensile yield strength. So far, it has been cast only by gravity, but deserves further study as a possible die casting alloy.

Progress is also being made on zinc alloys with superior properties in tensile and impact strength. Still too early to be announced these materials may bring about new engineering and design uses for zinc die castings.

Introduction of minor alloying elements, includin rare metals such as zirconium and titanium, and some of the alkaline earths, is being pursued as a means of improving the properties of aluminum and zinc die casting alloys.

DIE MATERIALS Rapid deterioration of dies when exposed to the higher temperatures of brass and the ferrous alloys has, for the most part, restricted the die castable alloys to those based on zinc, aluminum and magnesium.

Work in progress under ADCI sponsorship is directed toward improving die materials, to make possible, ultimately, die casting of the high temperature metals, and also to improve die life when casting the standard alloys.

CAST DIES Several major die casters have now had experience running castings in cast dies. The process of producing die cavities by casting them in ceramic molds (PMM March 1956) has now been licensed to a number of firms, including two jobbing die casters and several die casting die makers.

For the buyer of castings, this new method of producing cavities by the British-developed Shaw Process may be a means of cutting down on tooling costs.

According to the American agents for the process,

THAT MAY AFFECT THE USE OF DIE CASTINGS

GOLD DIP to give 24 carat coating to die cast zinc without electricity or special equipment is a newer finish.

VACUUM die casting, now installed in a number of plants, may lead to new applications for die cast parts.

BLACK-ANODIZED aluminum die castings are going into railway signal equipment, but color is still ahead.

Advances Lead To New Uses, Lower Costs

a great number of die casting dies have been made for zinc and aluminum alloys, and now some are being made for brass die casting. Most of the cavities so far have been made in a 5% chromium, .40% carbon, 1% vanadium steel. Die life figures are not yet conclusive, but no cavity or core failure has yet been reported. Finishes of cavities, from highly finished patterns, have been as high as 50-60 microinch. This is directly dependent upon the quality of surface on the pattern. There is about 25 microinch loss from pattern to the finished steel casting.

A training school has been set up to teach the methods of making castings by this British technique. Full economic and service-life records of the use of these cast cavities will become known as more firms gain working knowledge of the process.

FINISHES Further investigation of alloys and methods for providing color anodizing on die castings has been made, but is still in preliminary stages. One new alloy (PMM Sept. 1956) has been used for certain production jobs, including die cast aluminum combs in bright colors.

Use of vacuum die casting as a means of forming alloys that are not normally die castable is also being investigated. No production results have been reported.

Finishes for zinc have also received much attention, with the American Zinc Institute financing a program of research into improved chromium plating on zinc die castings, and new color finishes for zinc.

Newly announced also is a dip process to impart 24-carat gold to zinc die castings and other metals. Its developers, Baker & Co., Inc., say the Atomex (pat. pending) process gives a more permanent, less expensive coat than electroplating. Simple immersion is said to give uniform coatings, without problems of "throwing" into recesses. It takes three minutes at 60 C to deposit 1 mg/in^2 on die cast surfaces.

VACUUM DIE CASTING One of the most widely discussed developments is the vacuum die casting process (PMM Jan. 1956, Apr. 1957). A substantial number of installations have been made, mostly for zinc, although one machine has now been put to work by a Midwestern die casting firm to produce aluminum parts.

Commercial models and adapters for present models of die casting machines have become available. Whether this type of equipment will become generally used, or only for special categories of die castings, will be seen as the industry gains more experience with these units.

Proponents of vacuum die casting have pointed to superior surface finish and casting quality at lower cost, while skeptics claim comparable results with careful die design and machine operation. Whatever the outcome, the user of die castings is likely to

Continued on page 127

PMM **DIE CASTING FORECAST ISSUE**

New applications of die castings, expanded business, new alloys and new finishing methods helped increase metal sales in 1957.

1958? Metal Sales Will Expand

IN spite of price revisions during the second half of the year, the metals picture in 1957 was highly gratifying. All three major metals showed satisfactory gains over the previous year and the outlook for the coming year is equally bright.

ALUMINUM — Consumption of aluminum in 1956 reached an all time high and was then surpassed by 1957. Total metal poured this year as aluminum die castings will be about 385,000,000 pounds according to the American Die Casting Institute, or a gain over last year of 4.9 percent. When some 29 million pounds of metal for alloying with zinc and magnesium are added, the total aluminum consumption in die castings will reach 414,000,000 pounds (207,000 tons).

According to reports from some of the secondary smelters, there has been a steady increase over the past three years in the percentage of their output going into die casting. This increase runs from a low of 35 percent in 1955 to a high of 70 percent in 1957. At the same time there has been a noticeable decrease in the tonnage of metal going into sand castings. All of the smelters who reported expect a material gain in aluminum in 1958 with a part of this increase being taken by the primary producers.

The above estimates are supported by the Society of Die Casting Engineers who anticipated an increase in aluminum consumption of some 20 percent based mostly on automobile purchases.

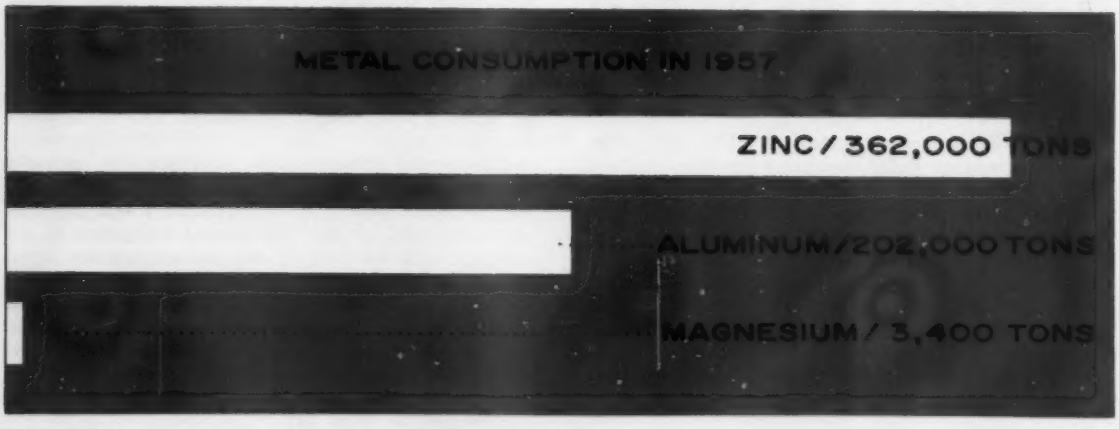
ZINC — Data supplied by the American Die Casting Institute indicates that zinc, despite some falloff, will regain all of the losses so that the consumption for 1957 will equal 1956 or 362,500 tons of metal poured. This estimate is in agreement with the findings of the Society of Die Casting Engineers. This latter group believes that some of the losses to aluminum will be regained by virtue of the use of vacuum die casting.

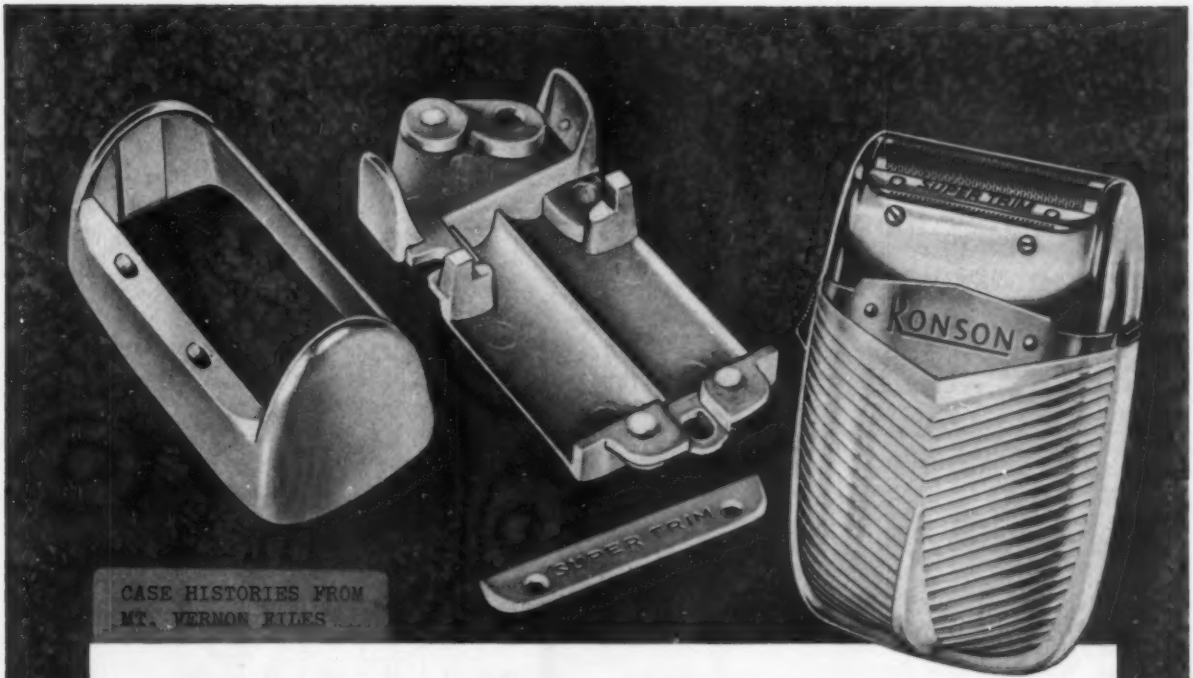
According to the American Zinc Institute the future looks bright for zinc. This group estimates about 200,000 tons of zinc die castings will be used by the automobile industry alone. The American Zinc Institute goes on to say . . . "Although the automotive industry is the largest single user of zinc die castings, new applications are cropping up every day. A recent survey in a prominent midwestern area showed that appliance manufacturers are switching to zinc die castings from other materials. Other industrial manufacturers are following suit. A large pulley company is converting entirely to zinc for heavy duty gear reducer components and other essential parts.

"At the same time, die casting equipment and techniques are being improved continually. Precision cast dies promise to lower die costs substantially for simple shapes. It is too early to say how far precision casting of dies will go."

MAGNESIUM — Reports from Dow Chemical Co.

Continued on page 128





CASE HISTORIES FROM MT. VERNON FILES

RONSON produces the First Electric Shaver with 2 Separate Cutting Heads

Ronson calls their new "66" Shaver "the most revolutionary electric shaver ever designed"—and offers strong evidence to support this claim. For one thing, it is the first electric shaver with an *extra* cutting head, called "Super Trim", which does every trimming job, from sideburns to mustache.

When any manufacturer is out to break precedent, and still sell his product at a competitive price, he needs every bit of designing and production skill he can find—anywhere.

Ronson found these in generous abundance at Mt. Vernon. Three of the vital parts of the "66"—the head frame and the plate covering the "Super Trim" blades (zinc castings), and the motor chassis (an aluminum casting)—were designed to obtain the special advantages of die casting: thin wall sections of great strength and rigidity, negligible machining, smooth finish, high speed production, low cost.

Says Ronson: "These parts are highly vital to our electric shaver. The cutting mechanism depends on the head frame for its accuracy of mounting and rigidity while cutting. The chassis on which the motor is built is of course the heart of the shaver's power system, and a very accurate casting is necessary for the job."

These advantages, important to any manufacturer, stem directly from the way we are organized here at Mt. Vernon. We have both the facilities and the complete die casting service it takes to produce parts like these, in any quantity, at minimum cost. We have 200,000 square feet of the most modern equipment for making dies and for die casting aluminum and zinc. And Mt. Vernon service comprises completely coordinated designing, die-making, casting, and machining, all under one roof.

It will pay you well to bring your production specifications to us. We may show you, as we did Ronson, the way to important cost reductions and improved products.

MT. VERNON
DIE CASTING CORP.
STAMFORD, CONNECTICUT

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For more information circle No. 77 on the Reader Service Card

Die casting machine sales in 1957 maybe above 1956 sales. In . . .

1958? — How About Machine Sales

SALES of die casting machines continued to rise though not quite as rapidly as had been anticipated. When the final figures for 1956 were in, they fell short of the estimated machine sales by about 20 percent. This would appear normal since the sales of die castings showed a similar decline for the year when compared with mid-year estimates.

First half sales for 1957 are reported somewhat below comparable figures for 1956 and estimates for the second half of this year show the same drop when compared with second half figures for last year. The differences, however, amount to only about 10%.

Except for the sales of very small (below 100 tons locking pressure) machines, there is not a significant change in sales by machine sizes. The machines in the range of 501 to 750 tons locking pressure continue to enjoy the greatest sales, a trend that first became noticeable about 1955. This, of course, reflects the parallel trend that has been seen in the size of castings being ordered. Most machine builders are of the opinion that the demand for this size of machine will continue through 1957 and into the next year.

Several observable trends in the die casting industry may bring some changes in machine sales during 1958. Assuming that there are no marked design changes in the near future, the growing demand for aluminum will probably be great enough to

DIE CASTING MACHINES SOLD IN THE UNITED STATES

	Tons Locking Pressure	1952	1953	1954	1955	1956	1st Half 1957	2nd Half 1957*
HOT CHAMBER	— 100	52	64	73	83	111	75	75
	101— 250	16	16	15	39	32	9	5
	251— 400	5	27	8	32	23	13	20
	401— 500	19	22	41	49	22	9	8
	501— 750	5	20	20	43	12	11	14
	751—1000	4	4	—	10	20	12	4
	Total ◊	101	153	157	256	240†	129	126
COLD CHAMBER	— 100	4	1	4	8	14	11	13
	101— 250	12	16	19	13	14	3	6
	251— 400	38	43	28	39	28	17	28
	401— 500	17	27	37	29	12	20	10
	501— 750	21	30	57	62	73	39	35
	751—1000	5	16	—	22	11	11	16
	Total ◊	97	142	145	173	160†	101	108
TOTALS	— 100	56	65	77	91	125	86	88
	101— 250	28	32	34	52	46	12	11
	251— 400	43	70	36	71	51	30	48
	401— 500	36	49	78	78	34	29	18
	501— 750	26	59	77	105	85	50	49
	751—1000	9	20	—	32	31	23	20
	Total ◊	198	295	302	429	400	230	234

* Estimated
† One company reported only total sales in 1956, no breakdown by size.
◊ Figures for 1956 and 1957 not directly comparable with previous years since two companies did not report this year and 1 company not previously included reported. Estimated error because of reporting changes less than 10%.

bring sales of cold chamber machines up to, or greater than, the sales of hot chamber units. The development of an anodizable and die castable alloy, or perhaps a method for plating pure aluminum onto aluminum die castings, will open a segment of the die casting market to aluminum that has always been held by zinc. Should either or both of these developments come, the segment of the market most affected will be in castings for household appliances and automobiles.

All this is, of course, highly speculative.

On a slightly longer range viewpoint the picture looks quite different. Active research work in alloying indicates that within the next year new, high strength zinc alloys may emerge that can open an entirely new market to die castings. As far as the die caster and machine builder are concerned, this development is probably at least two or more years away.

Figures for sales to both contract and in-plant shops show that during 1956 the in-plant shop accounted for a total of 252 machines sold out of a total of 400 or about 63 percent. However, the first half of 1957 indicates that a reversal of this trend is evident. Out of a total of 230 machines sold, only 101 or 44 percent went into so-called captive installations. This reversal bears out the findings earlier reported in this issue that most users, particularly those planning on using die castings for newly designed parts, will favor the purchase of castings from a jobbing foundry.

The opinions of producers of die castings quoted earlier indicate that the trend, noticeable over the past several years, toward larger die castings seems to continue strongly. Another trend toward the use of very small die castings is also evident. To the machine builders these indications would seem to point to the need for quite small machines capable of very high speed cycling. These machines will have to be as nearly completely automatic as possible. On the other hand will be the large machines capable of casting very large parts. Should these trends be borne out, the next few years should see greatly increased sales of these two sizes of machines.

DIE CASTING MACHINES SOLD OUTSIDE THE UNITED STATES

	Tons Locking Pressure	1954	1955	1956	1957*
HOT CHAMBER	— 100	45	65	73	86
	101— 250	12	5	—	3
	251— 400	3	—	3	5
	401— 500	2	—	2	—
	501— 750	—	—	—	—
	750—1000	—	—	—	—
	Total [0]	64	70	78	94
COLD CHAMBER	— 100	11	12	8	8
	101— 250	11	10	4	4
	251— 400	10	15	1	2
	401— 500	2	—	1	—
	501— 750	3	4	—	3
	750—1000	—	1	2	—
	Total [0]	37	42	16	17

SALES OF FIRE-RESISTANT HYDRAULIC FLUIDS QUADRUPLE
(gallons)

Year	Total Sales	Sales to Die Casting Industry
1954	493,000	329,000
1955	847,000	589,000
1956	1,342,000	899,000
1957	1,719,000	1,129,000

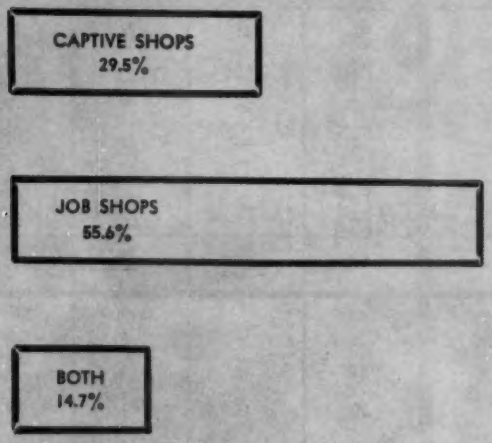
ONE of the most important advances in the die casting industry has been the development of fire resistant hydraulic fluids. These fluids have almost eliminated the danger to personnel from fire caused by leaky or broken hydraulic lines. Of almost equal importance has been the vastly decreased plant and time loss due to fire when hydraulic lines rupture.

That these fluids are being accepted by the die casting industry is amply evident by the above figures for hydraulic fluid sales in the past four years. Not only have sales almost quadrupled in this period, but every year for which figures are available, the die casting industry has accounted for nearly 70 percent of the amount consumed.

The early disadvantages of requiring special seals and packings have been overcome by the development of new materials that will withstand the softening action of some of the synthetic fluids. These fluids are now so widely accepted that probably within the next very few years all die casting machines will be supplied for use with some type of fire resistant fluid unless specially ordered for use with petroleum oils.

The figures in the above table were compiled from reports of the major suppliers of fire-resistant hydraulic fluids. 1957 figures are estimated.

Shell mold castings are made by . . .



1. JOBBING FOUNDRIES make up more than half of all shell mold casting installations. Most of these companies had previously operated some type of melting and casting facilities.

In these alloys . . .

	Jobbing	Captive	Both	Total
ALUMINUM	19	10	10	39
COPPER	20	9	9	38
IRON	18	11	6	35
STEEL	7	4	2	13
OTHER	10	5	2	17

2. NON-FERROUS ALLOYS are cast by a larger number of shell mold foundries than cast ferrous alloys, although the volume of ferrous work may be greater. Job shops cast a wider variety of alloys.

Widening design application and the work of jobbing foundries are shown in this PMM survey to be the key to . . .

The Growth Of

SHELL mold casting is still a young industry with a majority of companies working in it less than five years. Now that the fields of application are becoming better defined, and the demand for shell mold castings on the part of designers and buyers is increasing, as indicated by the above tabulation of products using these castings, many established sand foundries have added shell mold facilities. A substantial number of companies who make die castings, permanent mold castings and investment castings have also sought diversification by introducing shell mold equipment.

Most shell mold castings are now produced in jobbing foundries to meet customer specifications. The reasons: job shops can amortize the capital investment easily by spreading it out over relatively short runs of castings for many different industries; designers and buyers have been specifying shell mold castings and the custom producers of castings have installed equipment to meet the new demand.

Greater range of alloys cast was reported by the jobbing foundries. Overall totals show that more foundries cast non-ferrous than ferrous alloys. Is shell mold casting here to stay? Will it, as its most enthusiastic partisans contend, replace all but the roughest sand castings . . . or will it prove only an expensive refinement of the sand casting process with a very limited range of usefulness?

Today, little more than a decade after its introduction here, shell mold casting is being used in the manufacture of a large number of products. Several hundred companies have installed facilities, some jobbing, and some captive, and the indications are that the number of installations is increasing.

To fill in some of the answers on the present status and future trends of this new production casting technique, PRECISION METAL MOLDING magazine submitted questionnaires to executives in 400 shell mold producing plants. Information contained in the 102 replies reveals some interesting trends that are summarized here.

Today's typical shell mold casting operation, the study shows, is less than five years old, makes nonferrous castings for sale and has one or two shell mold machines. The average castings produced weigh less than five pounds, although castings of exceptional size have been made on a production basis.

Part of the reason for the greater diversification of

For these products . . .

Agricultural implements	Marine engines
Aircraft components	Missiles
Air conditioning	Medical equipment
Air hammers	Oil equipment
Anodes	Ordnance
Appliances	Permanent magnets
Automotive equipment	Piston & seal rings
Conveyor parts	Plumbing
Dairy equipment	Power shovels
Diesel engines	Printing machinery
Dust collectors	Pumps
Electric connectors	Railroad equipment
Furnaces	Refrigeration
Gasoline engines	Recreation equipment
Gas stoves	Sanitary fittings
Gas turbines	Special machinery
Hand tools	Steel making equipment
Hardware	Swimming pool equipment
Instruments	Small arms
Irrigation equipment	Textile machinery
Machine tools	Tools & dies
Magnets	Tractors
Electrical equipment	Valves
Electronic equipment	Vending machines
Extrusion tooling	Washing machines
Fittings & hardware	

3. DIVERSITY OF PRODUCTS now making use of shell mold castings is shown by the list above. Many industrial and commercial products have replaced sand castings with shell mold.

For these reasons . . .

Dimensional tolerances	19
Surface quality	14
Cost of castings	12
Metallurgical quality	11
Reduced machining of castings	9
Coring features	4

4. ACCURACY and quality are the two most important factors in the use of shell mold castings. Speed, ease of automation, less skilled workmen and smaller floorspace requirements were also mentioned in the replies.

Shell Mold Casting

alloys in job shops is due to the need to meet customer specifications. Captive foundries tend to produce from a more limited range of metals.

Average size castings made by the majority of firms are within the one-to-five pound category, with a large number of companies making castings averaging between three and 12 ounces. Two major foundries, both captive, claim average castings of 90 and 340 pounds apiece for specialized products.

Type of product in which shell mold castings are used appears to differ substantially when reports of captive and jobbing foundries are compared. The two principal types of products made by companies operating captive foundries are ultra long-run jobs, or else have some special features. Products made with job-shop castings cover a broad range of commercial and industrial products.

Reasons for increased usage of shell mold castings by industry fall principally under four headings: dimensional tolerances, surface quality, cost and metallurgical quality. One foundry pointed to shell mold casting as the only way a small foundry can stay small and still compete.

How long have you made them?

- Under 1 year — 5 companies
- 1 to 5 years — 55 companies
- More than 5 years — 27 companies
- Will — 3 companies

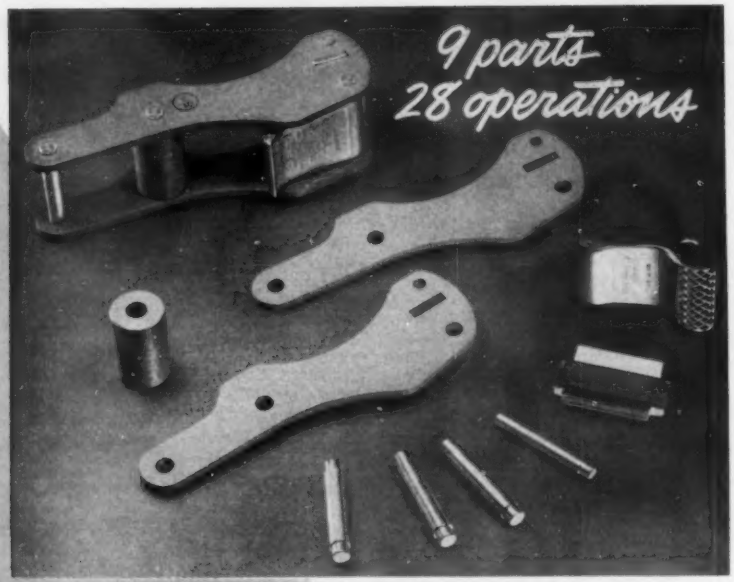
How many machines do you have?

Machines	Jobbing	Captive	Both	Total
1	14	6	7	27
2	13	8	4	25
3	4	3	3	10
4	2	—	1	3
5	4	—	—	4
6	1	—	—	1

What is your average size casting?

Under 1 pound	14 companies
1-5 pounds	47
6-10 pounds	2
11-15 pounds	13
Over 15 pounds	4

5. TYPICAL SHOPS, the study shows, are less than five years old, have one or two shell mold machines, and produce castings five pounds and under.



COVER STORY

Here's How To Cut Costs – Broaden Markets

By Garth Dickens*

RECOGNIZED as a national leader in production of air cargo and industrial load control devices (some 400 items), General Logistics, Pasadena, Calif., subsidiary of Aeroquip Corp., a year ago turned hopeful eyes toward consumer markets for an ingenious tension-energized strap buckle, and its counterpart rope restrainer for manila or nylon rope.

Extreme simplicity of design — a levered, tooth-faced cam being the only moving part — understandably suggested exploration of the consumer field.

But, how to manufacture for popular pricing, a composite article involving 9 manufactured parts, 14 manufacturing operations, 14 assembly operations?

The answer was suggested by

*Chief Engineer
General Logistics

the cam, die cast because its configuration precluded economical production by either metal stamping or machine finishing sand cast units.

Perhaps the entire buckle could be die cast in two parts, the frame and the cam?

Engineers of Union Die Casting Co., which had been producing General Logistic's cams, believed it possible, within size and strength limits acceptable to a wide range of popular uses.

Zinc alloy was selected as the casting metal, for its assurance of uniform strength and acceptance of cadmium plating to give the end product a brilliant "display" finish.

Experiments established that "Weblock" strap buckles having frame widths of ⅝" and 1" could be produced with unit-cast frames, complete except for holes, to accept die cast cams held in position by a hollow steel rivet. The buckles readily carried cotton webbing for light loads, and nylon webbing for strap loads of up to 600 lbs. tensile.

Similarly, "Ropelock" load control units were engineered for complete die casting, with the exception that the frame required casting in two sections, one sideplate being cast with separator pins and the other cast with holes receiving the pins of the opposite plate. Designed primarily to accept 5/16" nylon or manila rope, the unit was found capable of carrying a tensile load of 1000 lbs.

Reports Garth Dickens, General Logistics' chief engineer:

"Our initially-manufactured strap and rope tensioners contained built-in restrictions against wide application due to production and material costs. They were, and continue to be, ideal for their designed purposes of restraining aircraft cargoes imposing excessive tensile loads and yet offering fingertip release of webbing or rope. They required heat-treated steel side plates, die-stamped to provide shape and holes to receive separator bars. Numerous assembly operations were required in build-up of the completed unit. Inherent costs precluded consideration of attempting an invasion of low-cost markets.

"Die casting, however, has changed the cost picture radically. We have been able to substitute one part for several, and in the case of the 1-inch die cast 'Weblock' have eliminated five build-up assembly operations.

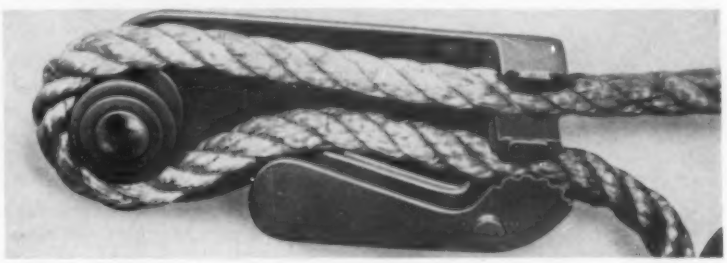
"As a result, we now are producing web and rope restrainers at one-third of the manufacturing costs involved in the 'assembled parts' manufacture of the originally-designed units.

"Die casting has opened the door for us, making available marketing opportunities previously denied by the cost factor."

The "opportunities" offered appear to be limited only by the imagination of General Logistics' merchandising planners.

The "Ropelock" is being packaged in eye-catching display boxes for hardware and sporting goods stores, and the "Weblock" buckels, carrying attached straps in 30", 4', 6', and 9' lengths, are being displayed on self-service racks.

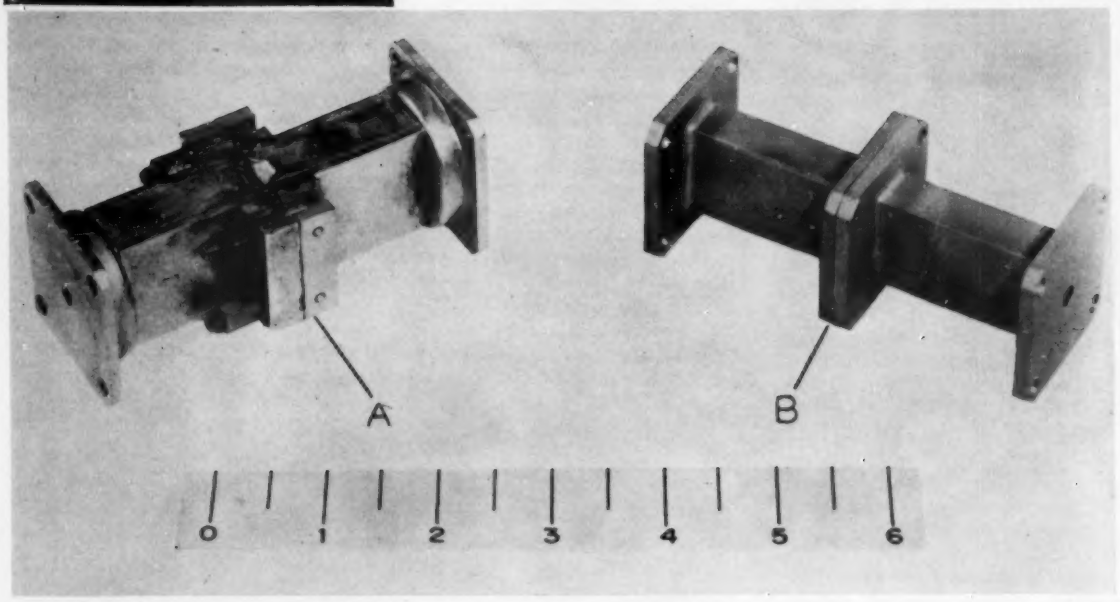
Promotional literature suggests use of the strap assemblies for tie-down of tents, awnings and canopies; tie-down of luggage on car racks; strapping of camping equipment and securing of boats on trailers. Buyers doubtless will discover a multitude of other uses, including modernized securing of Johnny's school books — minus any excuse that he couldn't get to their pages because an old-fashion strap buckle wouldn't "come loose."



MODIFIED cargo latches can be adapted for use with rope. Here is one type that has been developed for the consumer market.

Aircraft Weblock		Consumer Weblock
	Parts	
2	Aluminum side plates	1 Die cast zinc alloy frame
1	Die cast cam	1 Die cast zinc alloy cam
1	Steel pressure plate	1 Hollow steel rivet
4	Steel separator pins	
1	Roller	3 Total parts
9	Total parts	
	Manufacturing Operations	
3	Blank 2 side plates and tumble	1 Die cast frame
1	Die cast cam	1 Die cast cam
3	Blank, form and tumble steel pressure plate	1 Drill frame
5	Machine 4 separator pins and roller	1 Ream cam
1	Anodize side plates and roller	1 Purchase plated hollow steel rivet
1	Cadmium plate separator pins, pressure plate and cam	1 Cadmium plate frame and cam
14	Total operations	5 Total operations
	Assembly Operations	
5	Set 4 pins and roller in side plate	1 Mount cam in frame with steel rivet
1	Mount pressure plate in side plate	1 Flare rivet on semi-automatic assembly fixture
1	Mount cam on separator pin	1 Attach cotton or nylon strap
1	Mount second side plate	3 Total operations
5	Punch press rivet 4 separator pins and pressure plate	
1	Attach strap	
14	Total operations	

Comparison of parts and operations in the manufacture of two types of Weblocks.



1. WAVE GUIDE CAVITY seen above at left (A) is produced by the dip-brazing method of assembly. Costly warpage of the part when fabricated by this method makes investment casting more economical, producing part (B) seen at right.

Casting Vs. Brazing of Wave Guides

by K. L. Herrick* and S. Lipson**

Editor's Note: This article is a condensation of a paper presented at the fifth annual meeting of the Investment Casting Institute, Washington, D. C., May, 1957. The complete paper is available in the Institute Proceedings.

THE manufacture of components for wave guide applications has, in the past, relied upon fabrication techniques requiring accurate machining of all the elements and assembly by dip brazing. This is costly and warpage encountered in brazing produces non uniform operational characteristics. A solution to the troubles is to be found in investment casting.

While the early work was directed toward the casting of the simpler shapes, it is in the area of greater complexity that investment casting shows the greatest economies both in first cost and in uniform characteristics.

Dimensional tolerances usually specified for fabricated components were too close for investment casting. These tolerances had been established because of the non-uniformity of early fabricating methods. The high degree of uniformity possible with investment casting permitted opening tolerances enough to allow casting the wave guides. Any slight variations were then compensated by adjustments of the system. Experience with cast wave guides soon demonstrated that the assumption of serviceability as an acceptance test rather than compliance with arbitrary dimensional tolerances was valid.

*Metallurgist, Arwood Precision Casting Corp.
**Metallurgist, Pitman-Dunn Labs., Frankford Arsenal

METHODS & MATERIALS

In the following description of various microwave components, the methods and tooling developed were largely for prototype systems. Where quantities are sufficient, this work can be directly applied to production.

Pattern Dies

The dies used in making the wax patterns were made by machining the parts from brass, steel or aluminum; or by casting a fusible alloy around a metal master pattern. The fusible alloy dies were suitable for most parts except the most complex ones.

Wax Injection and Assembly

Wax patterns were produced on a low pressure, air operated, bottom injection machine. "C" wax at 200F was injected at from 40 to 80 psi, with a fill time of about 20 seconds and a dwell time of 1 to 2 minutes. Pattern uniformity, and hence casting uniformity, was controlled by the elimination of every possible variable. Where heavy sections were required, wax prefills were employed.

Investing

The investment material used was about 70 percent silica and 30 percent gypsum. The slurry was 45 parts water, 100 parts dry

investment mixture and 0.1 percent agar. Mixing, de-aerating, pouring, settling, etc., were all held constant.

Casting

Precasting treatment of the molds was by melting out the wax in a burn-out furnace. The cycle used was constant and took 15 hours with a maximum temperature for firing the mold of 1200F.

Only aluminum alloy 40E and silicon brass were used to make the castings. Melting was in a gas-fired furnace using a clay-graphite crucible. Mold temperatures were 400, 600 and 900F for the aluminum castings and 800F for the silicon brass. Pouring temperatures varied from 1250 or 1300F for aluminum to 1750 or 2050F for the brass. In all cases, constant mold and casting temperatures were used for duplicate castings to insure uniformity. All pouring was executed in a vacuum casting machine.

Cleaning and finishing

After cooling the castings were knocked out by hand, the gates cut off on a power band saw and the castings smoothed by sanding and filing. In some cases sand-blasting was used. Only a visual and rough dimensional check was made at this time.

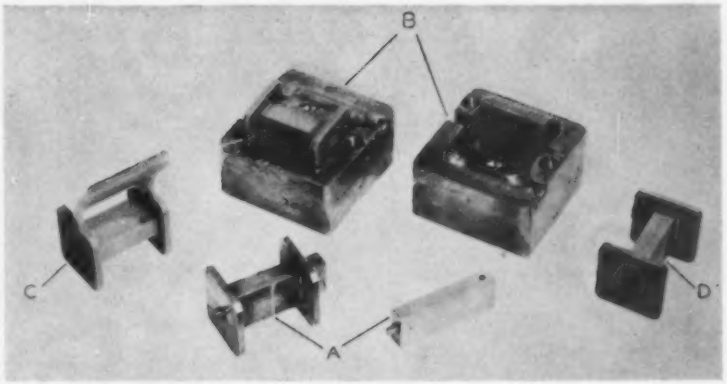
RESULTS

All castings were checked for electrical performance, regardless of dimensional deviations. This allowed studying the effect of any noted variations.

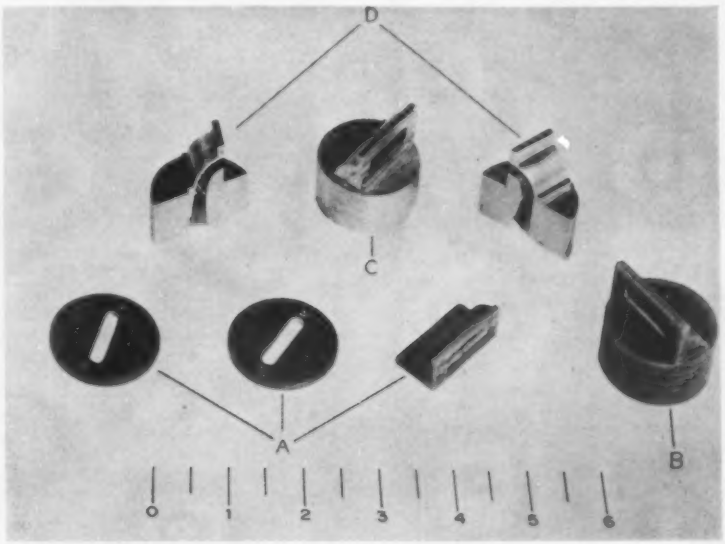
For the more difficult castings, the wax dies were laminated to facilitate changes if necessary. Since standard shrinkages could not always be applied this construction was highly desirable.

Interior surfaces were generally smooth. In the case of the aluminum castings a 60 to 80 micro inch finish was secured as cast. This is comparable to extruded tubing finishes.

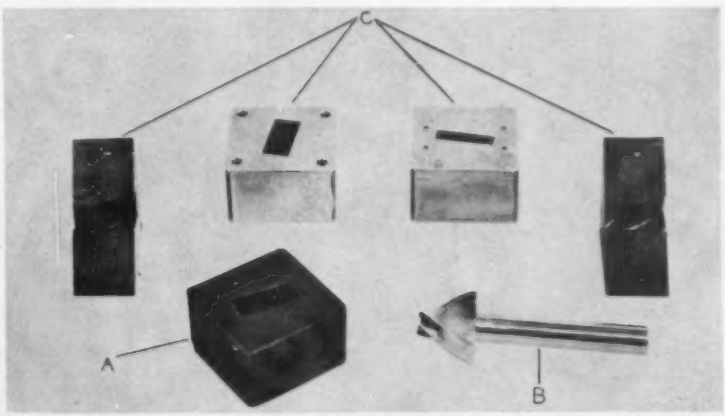
The final proof of the investment casting method of fabrication was in the electrical functioning of the castings compared to the same parts made by dip-brazing. Results showed that the castings functioned very well and that electrical data could be reproduced much better from castings than from one dip-brazed part to another.



2. PATTERNS AND DIES needed to produce investment cast ware-guide cavity are seen above as follows: A — Two master patterns; B — Fusible alloy die used to make the wax pattern; C — The wax pattern; D — the casting.



3. NINTEY-DEGREE stepped-twist bend. This part is produced in these steps: A — wax patterns of parts; B — wax patterns assembled; C — The 90° stepped-twist bend as it look after casting; D — The sectioned casting.



4. SEVENTY-DEGREE tapered-twist investment cast wave guide transition is made in these stages; A — Wax pattern is cast in fusible alloy die; B — Die part used in making the tapered twist; C — Castings, complete and sectioned.

DATA OFFERED IN THIS MONTH'S ADS

the Reader Service Cards on the facing page will get you these free reference materials. Circle the numbers and mail.

2. Die Casting Machines—Bulletin P-10 from ABC Die Casting Machine Co. Provides complete engineering data and process on the company's line of small die casting machines.

3. Die Casting Supplies—An illustrated bulletin from ACF Industries, Inc. describes their complete line of pots, castings, ingot molds, and goosenecks for the die casting industry.

5. Colloidal Dispersions—Bulletin 425 from Acheson Colloids Co. presents complete data on the different lubricants available for casting use.

6. Furnaces—Detailed technical information is available on the 60 cycle induction melting furnaces of the Ajax Engineering Corp. Ranging in size from 20kw to 2000 kw, the furnaces will produce from 150 pounds per hour up to 40 tons per hour.

7. Hot Work Steel—Allegheny Ludlum Steel Corp. presents its B-47 hot work steel for brass extrusion dummy block and dies, forging die inserts, press forging dies, and hot work in general, in a complete technical data book.

8. Dies & Related Tooling—A complete list of the facilities at Alliance Special Products is available with other informaon dies and related tooling.

12. Die Casting Machines—A complete catalog is available from American Die Casting Machinery Co. showing their complete line. Illustrations and prices are included.

13. Zinc Alloys—Complete data on zinc-base alloys is available from the Metal Sales Dept. of The American Metal Co., Ltd.

15. Aluminum Alloy—designed especially for die casting is fully described. Included are complete specification sheets on the as-cast properties of alloy Z-39 from Apex Smelting Co.

17. Fluxes—for all metal melting industries are presented in technical literature from Atlantic Chemicals & Metals Co.

20 13 Models—of die casting machines are described in detail in bulletins from B & T Machinery Co. Illustrated data presents the machines which range in capacity from 100 to 750 tons—for zinc, aluminum and brass.

22. Magnesium and Aluminum Castings—A 24-page book from Bendix Foundries, describes the company's new plant. Technical data is furnished on the advantages of aluminum and magnesium castings.

24. "Diecasting Small Parts"—is the title of a 24-page illustrated book published by British Industries Corp., explaining the entire process and the DCMT packaged die-casting shop.

26. Custom Alloys—An engineering handbook for metallurgists offered by Cannon-Muskegon Corp. gives complete data on their "UltraMet" and "Master-Met" alloy service.

27. Electric Heating Elements—Technical Bulletin "H" is available from the Globar Div. of The Carborundum Co. The resistance characteristics as well as data on stock sizes and application requirements are discussed.

28. Three Booklets—are offered by the Refractories Div. of the Carborundum Co. Besides the current issue of Refractories magazine on Refrax and a special bulletin on Refrax, a reprint of the article "Nitride-bonded silicon-carbide bridges gap between metals and ceramics," is offered.

29. Small Die Casting Machines—A Brochure from Cast-Master, Inc. gives full details and specifications on two new die casting machines, the 7Z for zinc, tin and lead, and the 7A for aluminum, magnesium and brass.

31. Die Casting Machine—Bulletin 600 from The Cleveland Automatic Machine Co. describes their new 600-ton die casting machine. It can be used with a hot chamber shot end or converted to a cold chamber machine if needed.

35. Special Castings—Crucible Steel Co. of America, Special Cast Products Div., offers an informative booklet describing the facilities of the company for producing specialized tool steel castings by the investment and other processes.

122. Cap Screws—Special socket head cap screws are just one of the many products of the Detroit Mold Engineering Co. listed with complete specifications in their engineering catalog offered here.

39. Die Cavity Sets—A 12-page brochure from the Detroit Mold Engineering Co. gives complete prices and specifications on six new standard sizes of cavity sets for die casting.

41. Thermometers—Precision thermometers featuring direct-drive bi-metal coils which eliminate gears and linkage, are presented with complete engineering data in the latest bulletin of W. C. Dillon & Co., Inc.

44. Plated Die Castings—Detailed information is available from DuWel Metal Products on their facilities for machining and plating die castings.

46. Furnaces—Bulletin C, from Eclipse Fuel Engineering Co., illustrates and describes 9 crucible and double chamber dry-hearth furnaces custom-designed for most metal-melting operations, to the industry.

48. Trimming Press—Federal Press Co. introduces its new Federal 55 press, which features oversize dimensions to handle bulky jobs, in a catalog which presents detailed specifications on the company's complete line.

52. Four Technical Bulletins—are available from Gries Reproducer Corp. Engineering data and illustrations present the company's complete line of products and services.

53. Aluminum Die Casting—A brochure, "Behind the Scenes", contains a complete digest of Hampden Brass & Aluminum Co.'s experience, equipment and facilities.

54. Shell Molding—Engineering data on H-W Forsterite Grain, a highly refractory magnesium silicate possessing physical properties which make it suited for resin-bonded shell molding, is available from Harbison-Walker Refractories Co.

Continued on page 111

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- ☐ Plaster Mold Castings
- ☐ Shell Mold Castings
- ☐ None of these

Please type or print clearly

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Name ..... *Position* .....

Company ..... *Kind of Business* .....

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1	18	35	52	69	86	103	120	137	154	171	188	205	222	23v	256	273	290
2	19	36	53	70	87	104	121	138	155	172	189	206	223	240	257	274	291
3	20	37	54	71	88	105	122	139	156	173	190	207	224	241	258	275	292
4	21	38	55	72	89	106	123	140	157	174	191	208	225	242	259	276	293
5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
7	24	41	58	75	92	109	126	143	160	177	194	211	228	245	262	279	296
8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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1	18	35	52	69	86	103	120	137	154	171	188	205	222	239	256	273	290
2	19	36	53	70	87	104	121	138	155	172	189	206	223	240	257	274	291
3	20	37	54	71	88	105	122	139	156	173	190	207	224	241	258	275	292
4	21	38	55	72	89	106	123	140	157	174	191	208	225	242	259	276	293
5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
7	24	41	58	75	92	109	126	143	160	177	194	211	228	245	262	279	296
8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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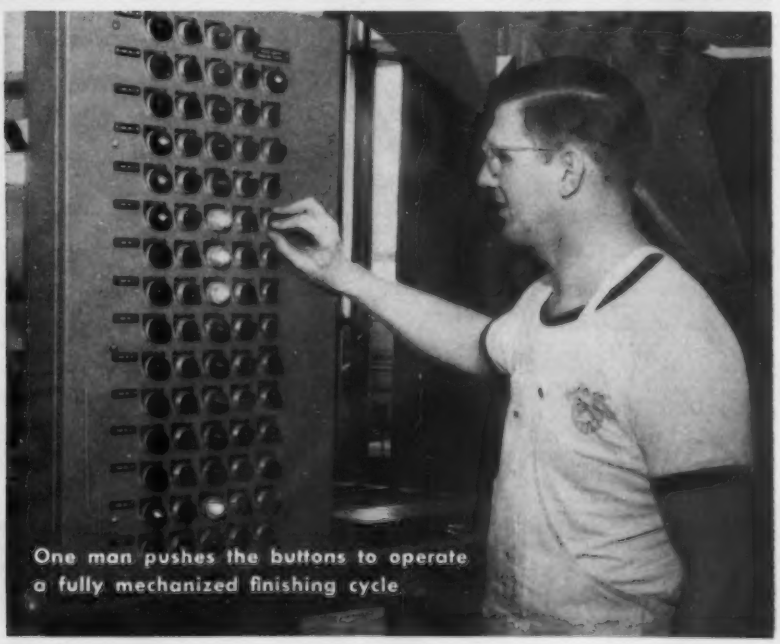
PMM

Finishing Section

The specialized finishing methods, equipment and materials used to machine, assemble, surface condition or surface coat precision metal molded parts are presented here. This includes all secondary operations which convert a raw casting to a finished product.



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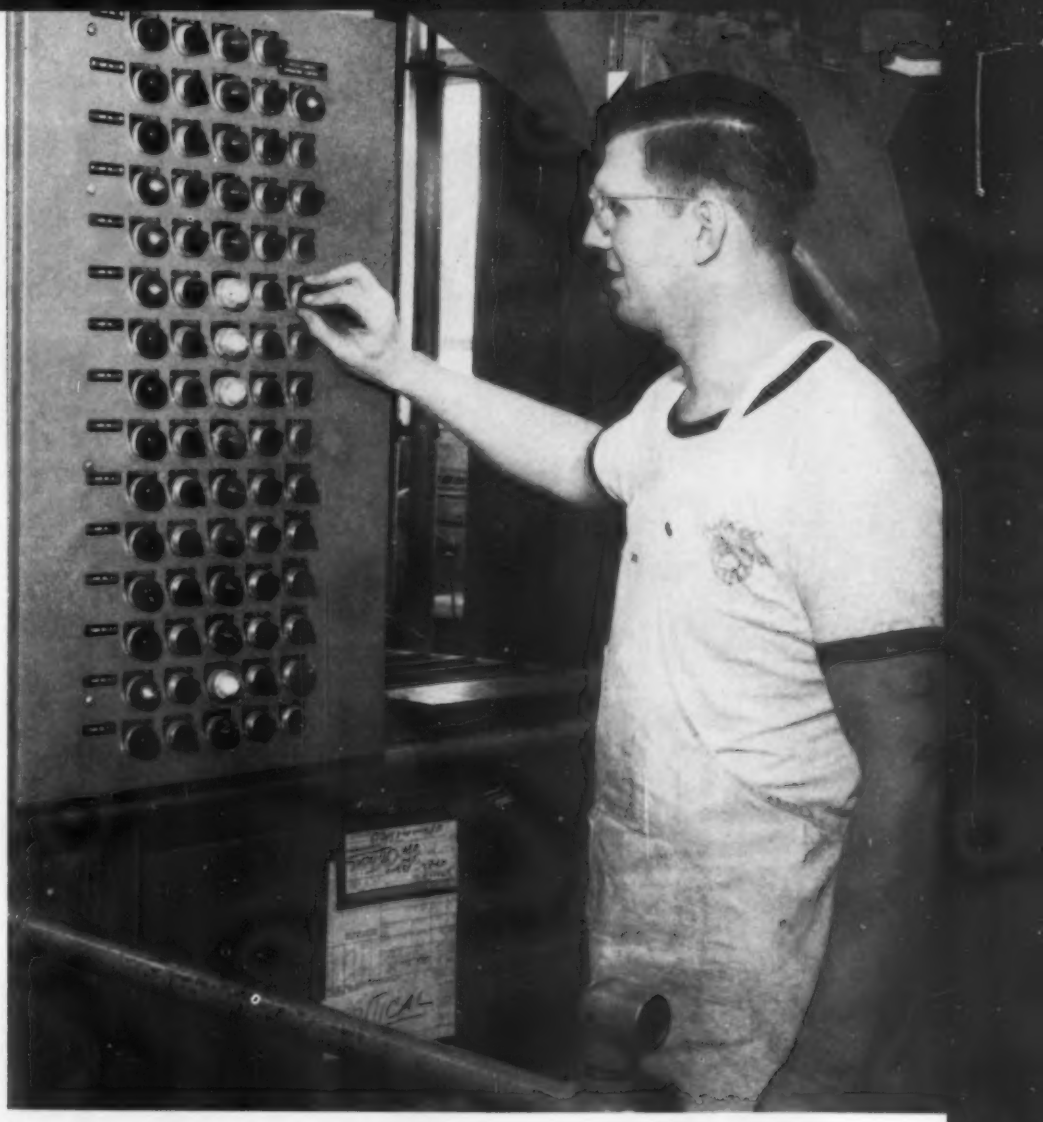
PMM FORECAST

Significantly there is a strong trend to ever greater mechanization in the finishing of die castings. The vast quantities of die cast parts produced and the impact of keen competition precludes the use of hand operations. Typified by the push-button control (right) are the equipment shown on the following pages.



Mass production manufacturing plus high labor costs require. . .

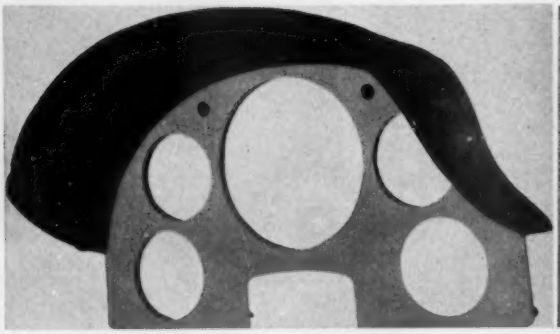
Mechanized Finishing Of Die Castings

When the number of individual pieces to be handled is considered, the surface finishing of die castings is one of the industrial giants of this country. No one has ever determined, and probably never will, the number of castings which receive some sort of surface finish each year.

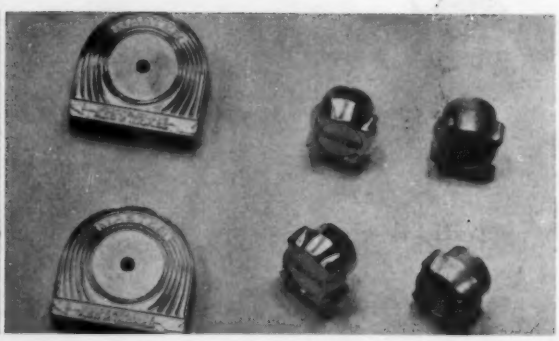
Counting only those castings which are painted, polished and buffed, and chromium plated, some indication of the size of this industry can be gained by estimating the number of finished castings used in one year in the production of passenger automobiles.

OVER 400 MILLION CASTINGS

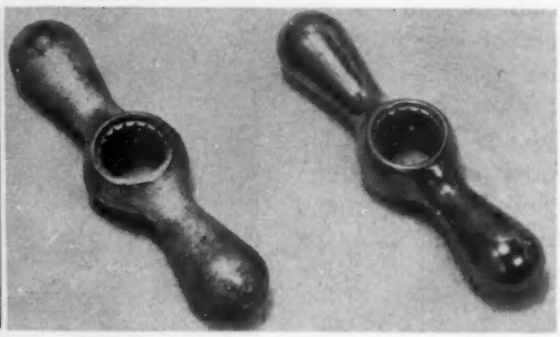
In 1956, when roughly 6.5 million average passenger autos were built, there were approximately 65 individual die castings per car which were surface finished. This gives a total of 422,500,000 die castings made and finished for original equipment only. The uncountable millions of castings made and finished for the replacement market and for accessories sold either through dealers or through automobile supply houses is not included. While admittedly the automobile industry consumes the greatest tonnage of both zinc



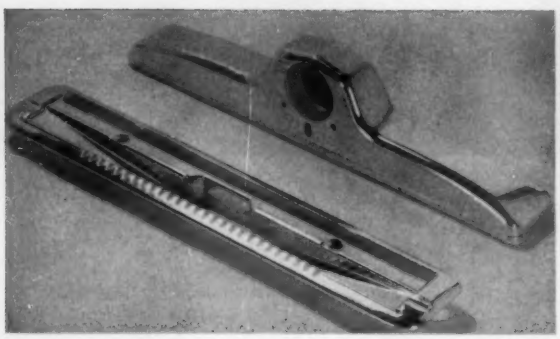
Automatic Spray Painting

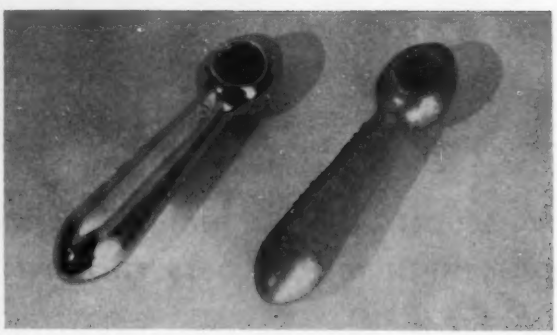


Automatic Buffing & Polishing



Automatic Barrel Finishing





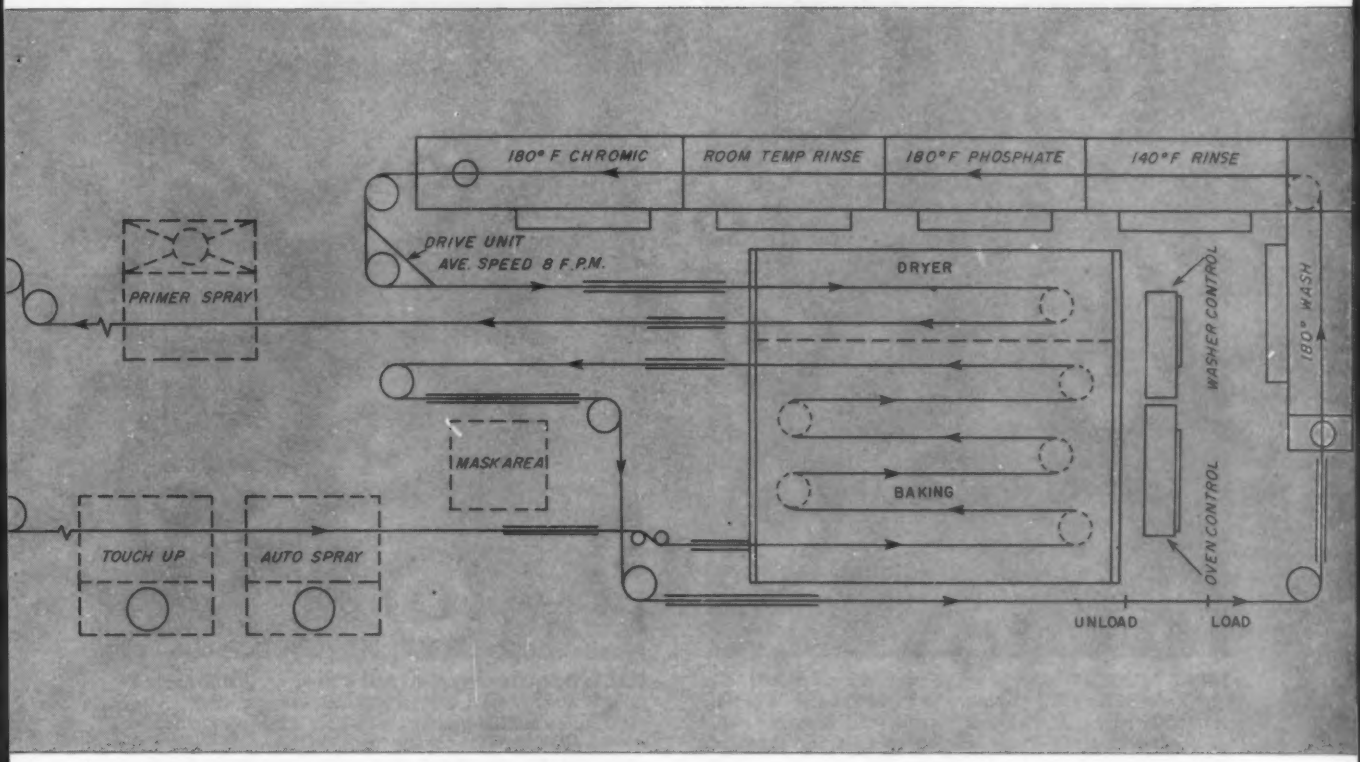
Automatic Plating

and alminum die castings, it is highly probable that the number of finished castings utilized by the household appliance industry equals or exceeds the number used in automobiles. Thus it can be seen that the painting and plating of zinc and aluminum die castings can well be classed as one of the very great mass-production industries.

It is also immediately obvious that if such tremendous numbers of individual parts are to be finished, hand methods cannot possibly be used without increasing beyond an economic limit the cost of the automobile, the appliance, the business machine or other product on which the die castings are used.

WHO DOES FINISHING

In general, all of this surface finishing is done in one of two types of establishment. Either the die casting foundry contracts to furnish a completely finished casting, or the rough trimmed and perhaps partially machined casting is delivered to the ultimate consumer, who then completes the part. Because each establishment in which finishing is done is geared to high volume work, it is only natural to find fully automatic equipment used for all of the finishing operations.



Automatic Spray Painting

PROBABLY the greatest number of die castings receiving some type of surface finish are spray painted. Where the volume is great enough to warrant a reasonably expensive installation, it is usual to find these spray painting installations fully automatic. Such an installation must, of necessity, assume that the castings come to the paint spray department already cleaned and degreased, and if specifications call for it, already treated with some type of chemical conversion coating to give adequate "tooth". In the normal set up, special fixtures are designed to pass the castings in front of spray guns and have all necessary surfaces uniformly coated. In order to do this, these fixtures may be designed to rotate or to oscillate. One, or at the most two men will be required to operate such a system, whose entire task will be loading and unloading the castings.

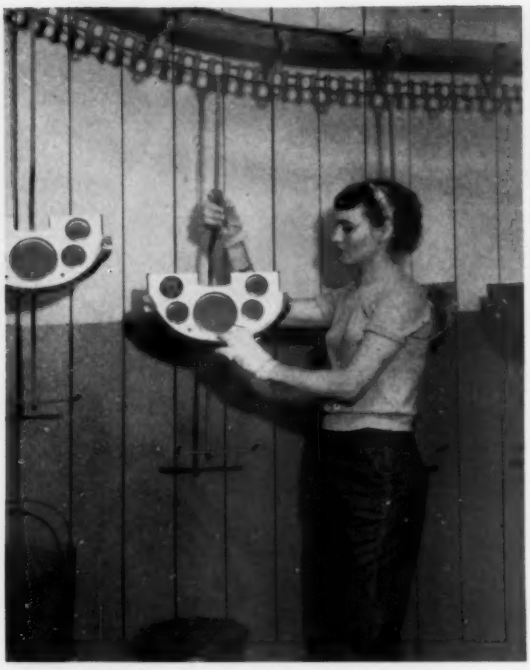
When the castings are loaded onto the conveyor they proceed to the spray booths. Here the "guns" are synchronized so that paint sprays only when there is a casting within the area covered by the spray pattern. As the casting passes on to a second "gun" or out of the booth the flow of paint is halted.

Generally, there are only three systems of paint spraying in common use. The paint may be thinned to proper viscosity with a fast drying thinner. The paint of much heavier consistency, at room temperature, may be heated to reduce the viscosity to the desired level. The paint, reduced with thinner, may be deposited from an electrostatic device of some sort. What ever method is used, the mechanical procedure will be the same. The castings on their fixtures will be conveyed in front of the guns at a rate sufficient to deposit the required amount of paint on all surfaces.

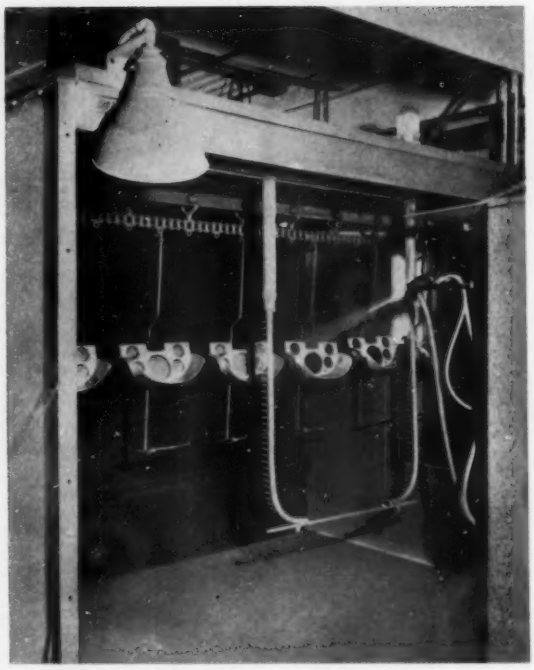
From the spray booth, (there may be several booths in series to give more than one coat), it is usual to have a drying leg where excess solvent evaporates at room temperature. From the drying leg the castings pass into a controlled temperature oven. Generally these ovens utilize both radiant heat and convected heat for drying, and the length of the oven will, of course, depend entirely upon the rate at which the paint line must move.

From the drying oven the castings return to the loading and unloading station over an air leg long enough to allow them to cool to permit handling.

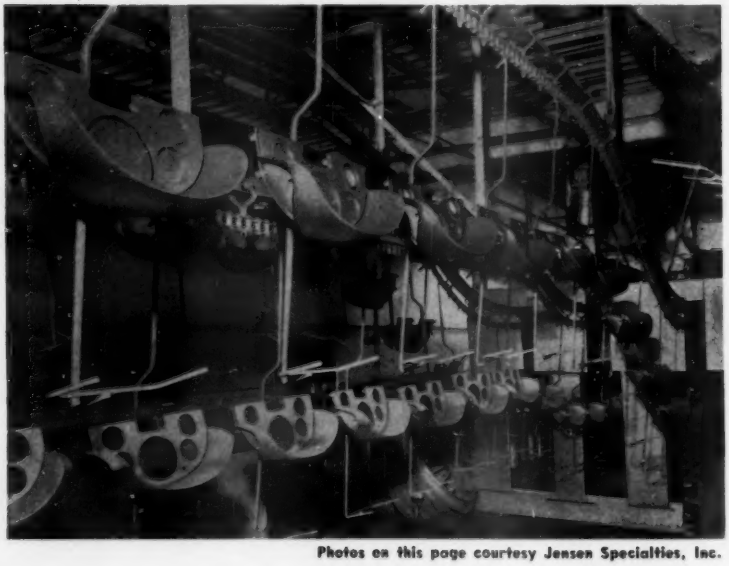
The following illustrations, with the schematic floor plan, are typical of a paint spraying installation utilizing compressed air spray guns, with the paint applied at normal room temperature, one electrostatic system is shown.



SPRAY-PAINTING of automotive parts must proceed at a rapid rate if finishing costs are to be held down. Here an automatic spray line utilizes a mono-rail conveyor with suspended carriers. Parts are loaded in front of a five station washer-degreaser and dryer. The conveyor travels at 10 ft. per min. with a 7 to 1 speed variation. This speed variation allows a change in the conveyor speed of two ft. per min. The total distance of travel between loading and unloading is 535 ft. and normal operation, with two operators, is 380 parts per hour. Normal rejects on this system are under 1 percent.



ELECTROSTATIC spray guns are used for paint application. A primer coat is first applied using a single spray gun. Following the primer coat a first finish coat is applied by the second operator on the line using a hand held spray gun. Finally, the parts move to another booth where the final paint coat is applied electrostatically by two synchronized units. This system is not, of course, limited to the application of a single color. When desired, color changes can be made automatically in about 30 seconds. Air drying only is used between the different coats of paint.



Photos on this page courtesy Jensen Specialties, Inc.

PAINT BAKING follows the last spray coating. The parts pass along an air drying leg where the bulk of the free solvent evaporates and then into a dry-off oven. Here the residual solvent and thinners used are evaporated prior to actual paint baking. This step is required to prevent the formation of blisters and bubbles during baking. In the dry-off section convection air heating is used. For baking, infrared heaters are employed. These are radiant rod types. Baking temperature is about 300F and the total time for drying and baking is only 12 minutes. The oven is a six-pass type with the drying section separated from the baking section by a sheet metal baffle. After cooling the parts pass to the unloading station adjacent to loading.

Photo courtesy The DeVilbiss Co.

RIGID MOUNTING of the parts to be painted is often necessary, particularly when they must be rotated during spraying and when any "swing" of the supporting members can not be tolerated. For such applications, a chain-on-edge conveyor system is often incorporated into an automatic paint spray system. In this unit, such a chain-on-edge conveyor is used with vertical spindles on which work-holding fixtures are mounted. The part to be painted is placed on the fixture and passes to the first spray booth. This system requires that the parts be clean and dry when they come to the loading station.

As the conveyor moves the parts are carried to the spray booths (above, right). Here, the flow of paint is triggered when the parts are in position. Rotation is used to assure covering all surfaces and, when necessary, one or more of the guns follows the parts as they move along the conveyor system. Air drying to evaporate solvent follows and then paint baking using infrared lamps. After baking the finished parts are cooled and then unloaded. One operator can operate the line.

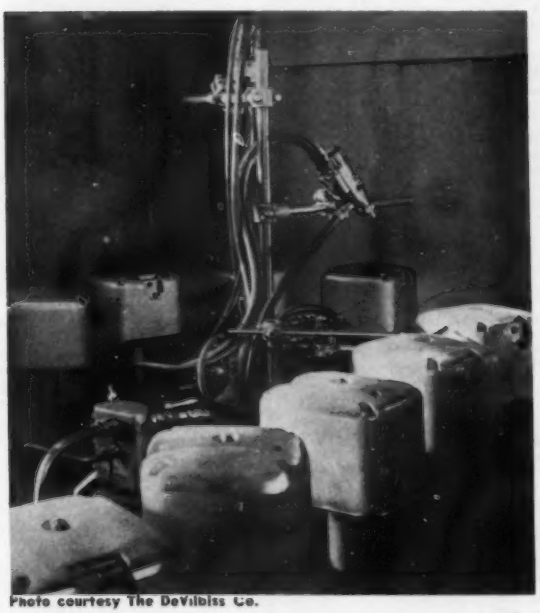


Photo courtesy The DeVilbiss Co.

AUTOMATIC TRACKING of the parts by the spray guns may be required to secure complete coverage. After spraying is completed the gun returns to its starting point in time to paint the next part.

Photo courtesy Finish Engineering Co.

MASKING is widely used when two color or decorative finishes are required. Here an automatic masking and spraying machine is in use. The parts are loaded into the desired mask, then rotated past a spray gun.

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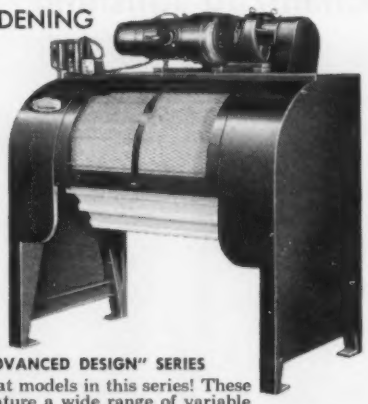

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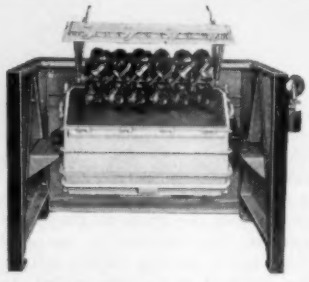
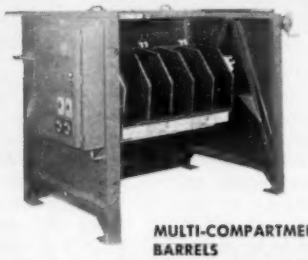


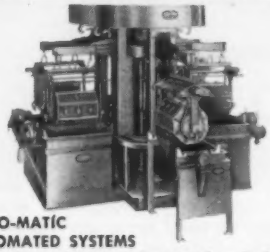
"FIXTURE" TYPE BARRELS

Pioneered by Almco for processing large and intricate parts. Custom designed fixtures hold parts securely, prevent part-on-part impingement and allow abrasive action to reach all surfaces, cavities, slots, etc. Barrels have automatic forward and reverse controls. Almco also offers integrated materials handling systems for further barrel finishing economies.



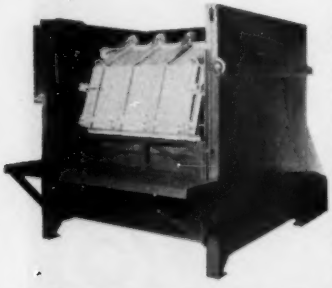
MULTI-COMPARTMENT BARRELS

Do you have these deburring and finishing problems — wide variety of parts or small quantity runs where fixtures would be too costly? Or short to medium cycle runs where you could *re-use* compound for several runs? Lack of floor space for several machines? An Almco custom-designed multi-compartment barrel may give you a cost-saving answer. Automatic forward and reverse. Any combination of compartments and doors.



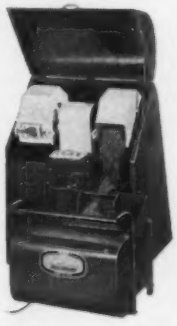
SUB-O-MATIC AUTOMATED SYSTEMS

Almco's exclusive submerged unit is an automatic, "assembly line" system for micro-precision deburring and finishing of small parts in quantity. Saves labor, speeds up processing and flow of high production parts. One man for example can operate this equipment and handle as many as 192 barrel loads per 16 hr. day. Slashes compound expense to minimum because compounds can be re-used for days at a time. These submerged systems can also be obtained in non-automated, straight line systems.



CUSTOM-DESIGNED BARRELS

Almco designs and manufactures special barrels of all types for problems where standard equipment cannot be effectively used. These range from the smallest type to the largest fixture barrel such as the 60" diameter x 60" length barrel shown above. Special large diameter barrels with double flat or triple flat doors are also available to accommodate extra large parts and to allow abrasive media to flow freely over the outer periphery of the part. Your special problems may be solved with one of Almco's custom-designed barrels. Material handling systems can also be closely coordinated with special barrels.



SMALLER MACHINES

Twin barrel machines manufactured by Almco are the standard of the industry for shops processing small lots of parts and for companies with large lots of small parts. Also ideal for sample processing, barrel finishing research and development work, and as auxiliary equipment. These units are Almco engineered to the highest specification standards and include operational and safety features found on larger Almco machines.

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Almco deburring and finishing machines are ruggedly constructed to perform on a round-the-clock basis. They incorporate the best engineering design required in the industry — your assurance of versatility and economical processing of work parts. Optional equipment includes material handling devices and systems, automatic forward and reverse, double or triple flat doors, single and dual timer controls for automatic delay starting and stopping, perforated drain doors for flushing and rinsing, unloading devices, etc. Also a full and complete line of Almco Supersheen barrel finishing compounds and media of all types made especially for use with Almco precision barrel finishing equipment.

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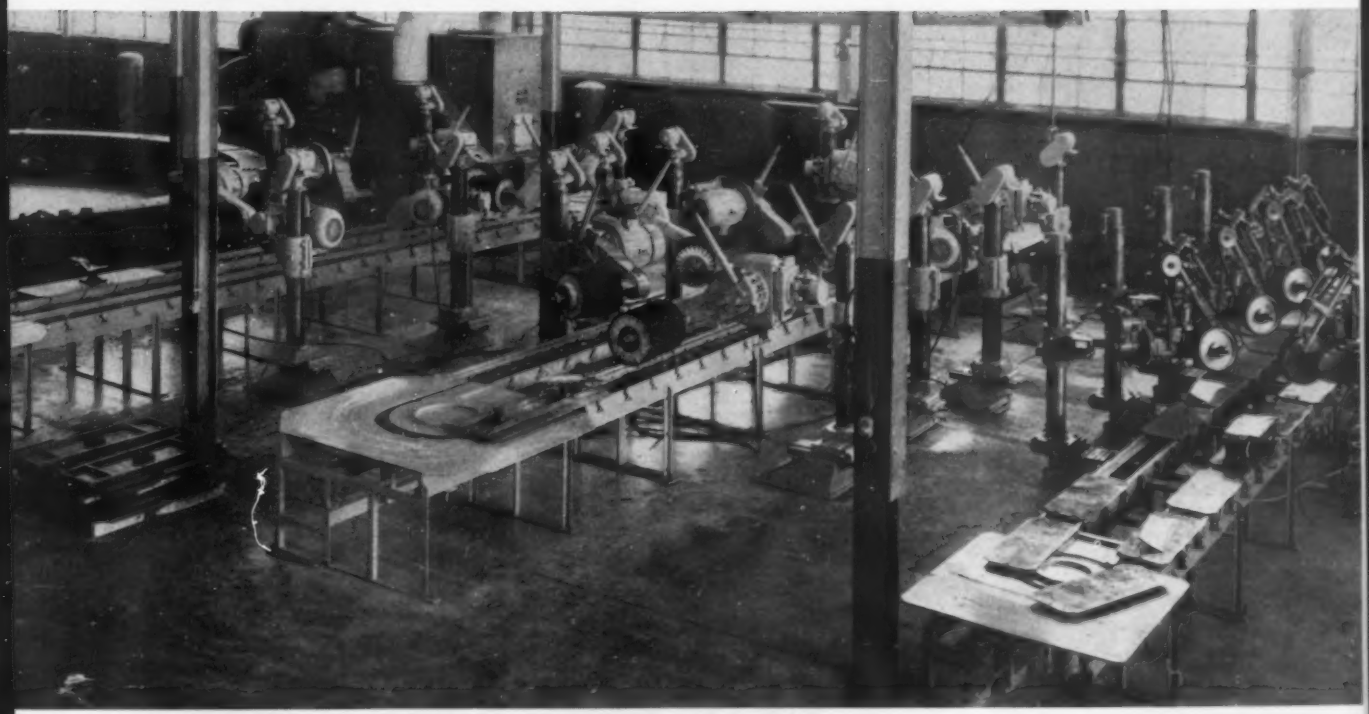


Automatic Buffing & Polishing

All casting to be plated and all aluminum castings used as decorative parts must be buffed and polished. As a starting point for such parts a "hardware finish" is always specified. After trimming the flash and removing the gate and riser, the catsings are generally sanded to remove trim marks, vestigal flash and to blend the trimmed area into the adjacent surfaces.

All machining operations must then be performed and the parts degreased and cleaned of all surface soil. They are then ready for the final buffing and polishing.

Special jigs and fixtures are always required to hold the castings firmly during polishing. These fixtures are designed to hold the parts on non-critical areas or by pins or holes that will later be used in assembly. This feature must be remembered in the design of jigs and fixtures. The entire mechanization of a finishing line is to speed-up production. Therefore, loading and unloading must be done at the speed the conveyor moves.

The automatic polishing line utilizes, for the most part, the two basic work horses of the polishing industry — an abrasive belt and a buffing wheel.

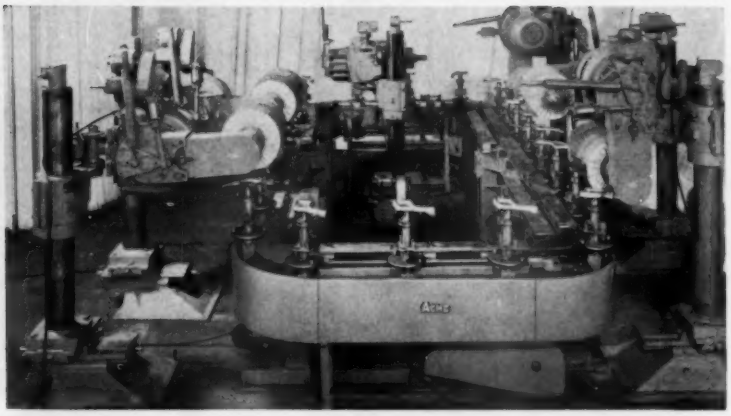
Where in non-automatic operations these pieces of equipment are set up on polishing lathes, on automatic set-ups they are built as small units or "heads". These heads allow extreme flexibility of mounting, since they are relatively small and can be set for any desired angle. Some of them are built to oscillate either in a horizontal or vertical plane during the polishing operation, while others remain stationary.

As the castings pass in front of each successive head or group of heads, they pause while the area to be polished undergoes work. At this point there may be a reciprocating action or an oscillating action, or, for that matter, the parts may be rotated.

When the particular area has been polished, the conveyor system moves the casting to the next head or group of heads, where an entirely different surface may be worked. The change in surface can occur either by shifting the angle at which the casting rides, by changing the position of the heads, or both.

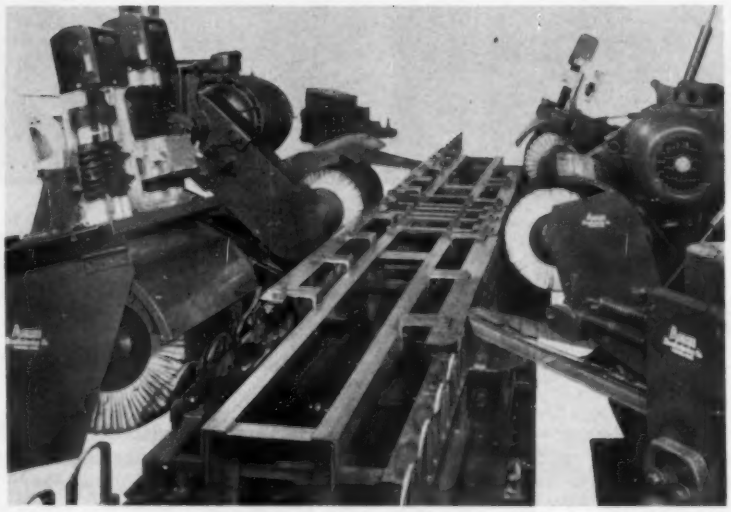
As the castings move along the conveyor system, the fineness of the polishing grit is gradually reduced so that before discharge, complete polishing, buffing, and coloring has been achieved.

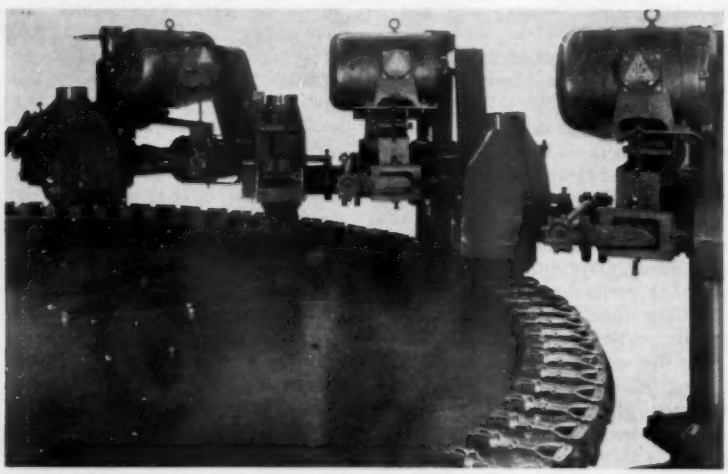
As in every other case of automatic finishing, the aim of the equipment designer is to limit hand work to loading and unloading. As the following illustrations will show, this can be accomplished by the judicious selection of suitable components.



LOAD AND UNLOAD is the complete story of this highly mechanized polishing and buffing line. And one man can handle two or more of these automatic units. In some cases return line systems such as the one shown here are used and in other cases a straight line system is more advantageous. In the latter case, of course, an operator at each end of the line will be required. By varying the type of wheel and the type of compound used the degree of polish advances from station to station. Using pedestal mounted units permits the greatest degree of flexibility. Heads can be moved forward or back, up or down, or laterally along the table.

FIXTURE DESIGN is of utmost importance in automatic buffing and polishing units. So also is proper design of the casting to be finished. At the start, the design must be such that the maximum amount of surface to be polished can be exposed to automatic operation. Then with correct fixture design only minor blending operations might have to be done by hand. When light to medium surface sanding must be done, belt type or drum type sanders are mounted instead of polishing heads. Generally, with this type of mechanized equipment it is not desirable to try and rotate the parts in front of any of the wheels.

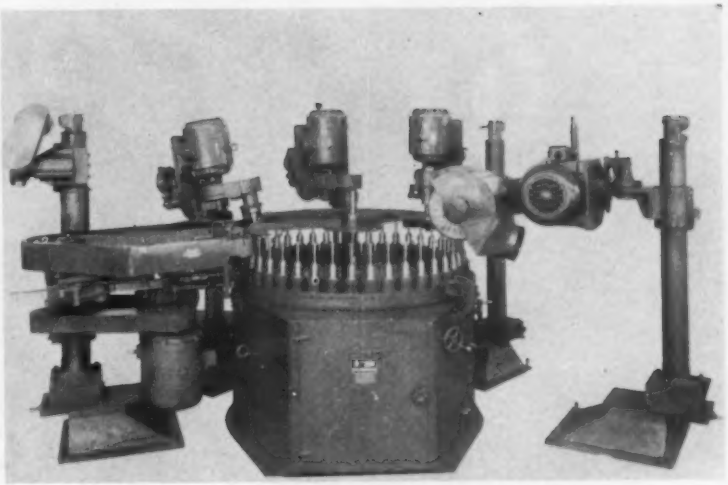


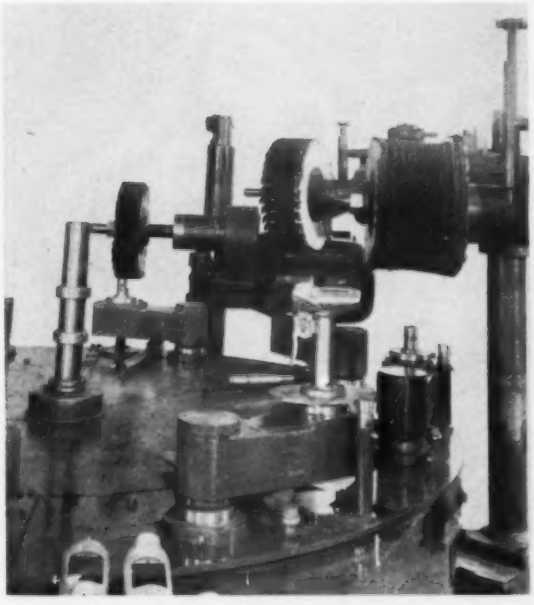


ROTARY TABLES are often the most advantageous. Indexing, speed of rotation and inclination of the part are all controllable. As in the previous cases illustrated it is required that all of the parts be the same since skip station polishing is difficult to secure. Here again pedestal mounted heads are used to provide the greatest possible degree of flexibility. In some cases these heads can be given an oscillatory motion to polish a larger surface than that under the wheel at any given time. This motion is cam controlled and in timed sequence with the table movement. The length of stroke is controllable by adjustment of the cam follower and frequency is varied by cam speed control.

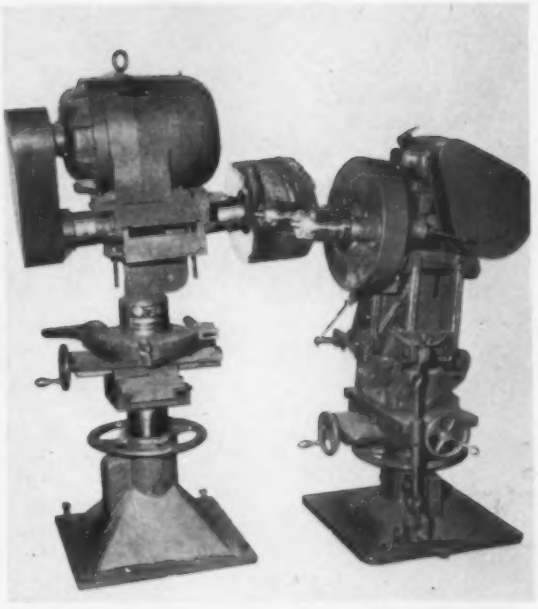
mechanized finishing

ROUND CASTINGS are automatically buffed and polished on this type of rotary machine. Again pedestal mounted heads are positioned around a rotating table. The heads are set at the proper angle to secure finishing of one area at a time. At each station the parts are rotated at relatively high speed, generally in opposition to the rotation of the polishing wheel. As in all fully automatic systems the buffing and polishing compound or lubricant is machine fed to the wheels. Even when built up, charged wheels are used, some lubricant must be used. As noted before, these mechanized buffing and polishing units require only one operator who loads and unloads the parts. Sanding operations for flash removal can be incorporated in these automatic units when desired.



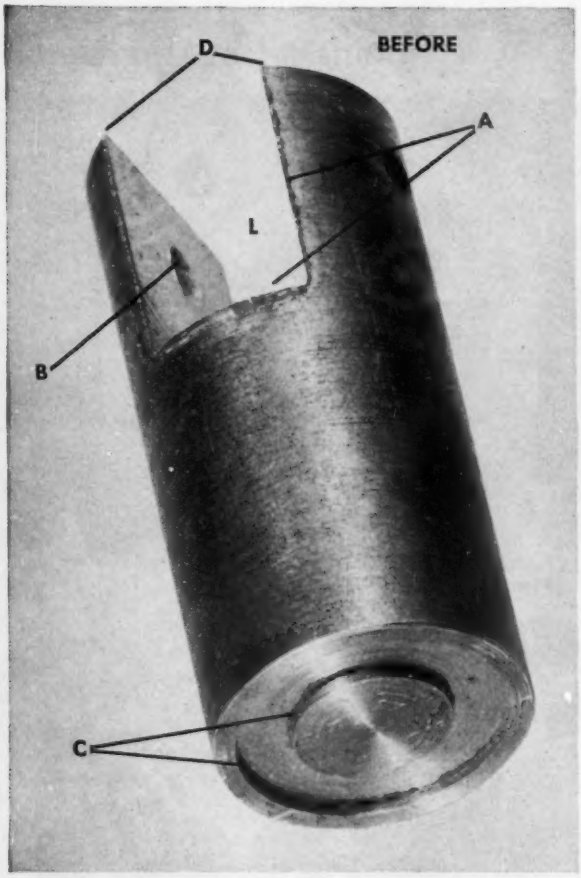


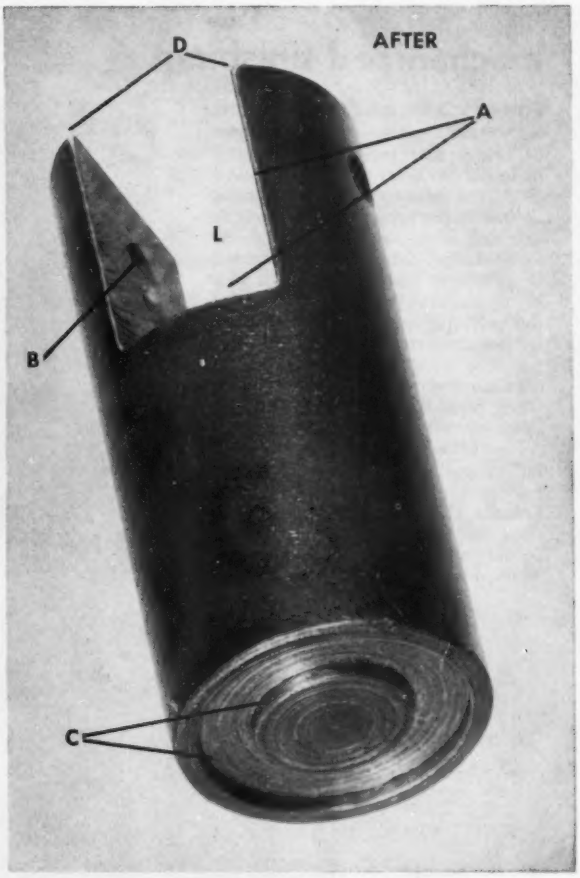
A CLOSER LOOK at a rotary buffing and polishing unit. The divergent angles at which the heads are set and the different types and sizes of buffs used is here more clearly evident. This type of unit can be used with the work pieces either stationary or rotating. Zinc, aluminum, magnesium and brass die castings can all be buffed and polished, though generally they cannot be intermixed. As in some of the other equipment discussed and illustrated, the polishing heads used here can be made to oscillate when necessary. Generally, however, it is preferred to set them rather rigidly and have the part move. This latter movement is accomplished by cams at the individual stations. These cams can impart motion in either the horizontal or vertical planes. With this high degree of flexibility it is possible to bring almost every surface under the buff.



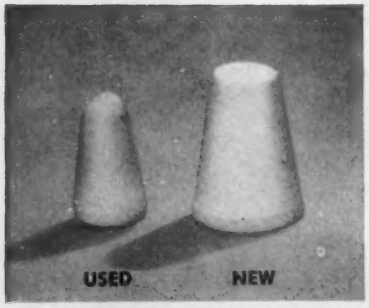
MORE COMPLEX SHAPES or lower production rates will frequently preclude the use of one of the large, fully automatic installations that have been illustrated above. For these cases a standard pedestal type polishing unit is used with the part, or parts, mounted on a separate cam operated work holder. Generally these work holders accommodate two parts so that while one is being polish[ed] the operator can load and/or unload the other one. [As] a rule only movement in one plane is provided by [the] work holder although some units are built that [can] oscillate as well as rotate the part. Charged, [built-up] wheels are generally used and the compound [is] often applied by hand.

All illustrations in this section courtesy of the [Acme] Co.





This critical barrel finishing problem solved with "HONITE" Brand CeramiCones



AFTER 550 HOURS use the CeramiCone left retains its exclusive truncated cone shape. Every part of each chip is a working surface—and they're next to diamonds in hardness.

Controls Company of America, Soreng Division, had a major problem in the barrel finishing of mild steel solenoid plungers. Removing milling burrs (A), piercing burrs (B), and burr removal and corner break at (C) with conventional barrel finishing chips was causing much lodging of chip particles in the finished plunger. Two full-time additional inspectors were required to remove these particles.

The company—a leading producer of solenoids—found that a chip large enough to avoid lodging at (C) would lodge in milled slot (L) or would peen corners (D). Too small a chip would fail to remove burrs (A) or would lodge in pierced holes (B).

A "HONITE" Engineer solved this company's problem with CeramiCones—the amazing new precision-molded chips made of high-strength, non-crystalline ceramic. Results: CeramiCones stopped lodging *anywhere* and the additional inspection operation was discontinued. Finishing costs per thousand plungers dropped to ½¢ with improved surface finishes, impingement and nicking was eliminated, and because of faster burr removal the time cycle was cut ⅓ with improved corner break.

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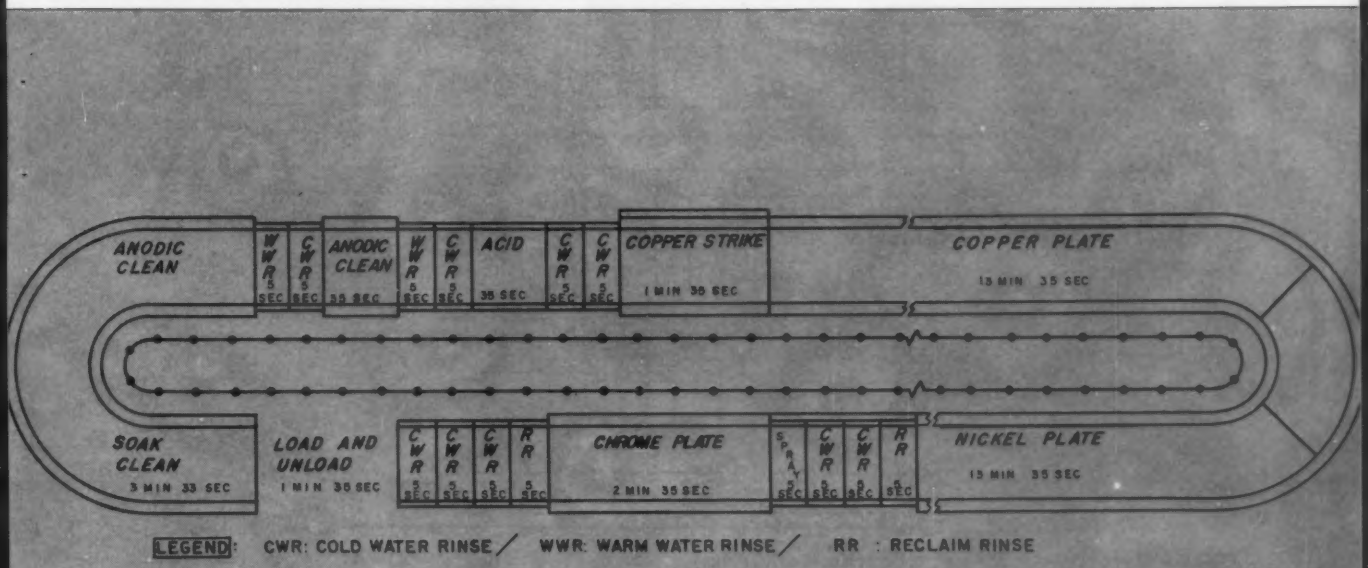
ANODIC CLEAN
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COPPER PLATE 15 MIN 35 SEC
SOAK CLEAN 3 MIN 33 SEC
LOAD AND UNLOAD 1 MIN 35 SEC
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RR 5 SEC
CHROME PLATE 2 MIN 35 SEC
SPRAY 5 SEC
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CWR 5 SEC
RR 5 SEC
NICKEL PLATE 15 MIN 35 SEC
LEGEND: CWR: COLD WATER RINSE / WWR: WARM WATER RINSE / RR : RECLAIM RINSE

Automatic Cleaning & Plating

AS in the case of other finishing operations on die castings, it is possible to design plating equipment that is entirely push button operated.

Following buffing and polishing, or barrel finishing, the parts to be plated must generally be cleaned by either solvent cleaning or vapor degreasing or both. Where these operations can be done on racks of parts the parts can then pass through precleaning, final cleaning, plating, drying and then on to either shipping or assembly. Transfer from one line to another is entirely automatic and cycling through the various stages is preset.

The further flexibility of modern plating systems is demonstrated by the ability of the machine to vary dwell time, to skip stations and to perform other operations that formerly required still tank plating because of the varied conditions.

Parts made of steel, brass and zinc can be put through the same machine so long as only one type of part is on a rack. If certain of the stages normally used are to be omitted on any rack the plating machine will automatically skip such stages by holding the rack of parts out of the solutions.

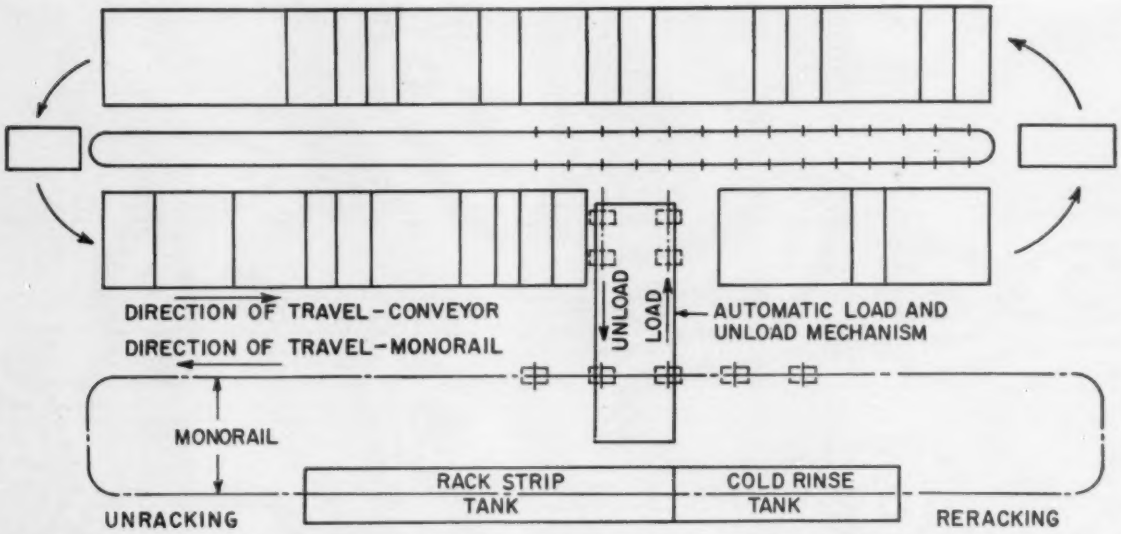
Finally, when the completely plated parts come from the plater an automatic transfer unit will send them on their way to one or more points by selecting the proper conveyor line.

All of this can only be accomplished when the volume of parts is great enough to justify an extremely expensive installation. How about those cases where such an expenditure is not justified?

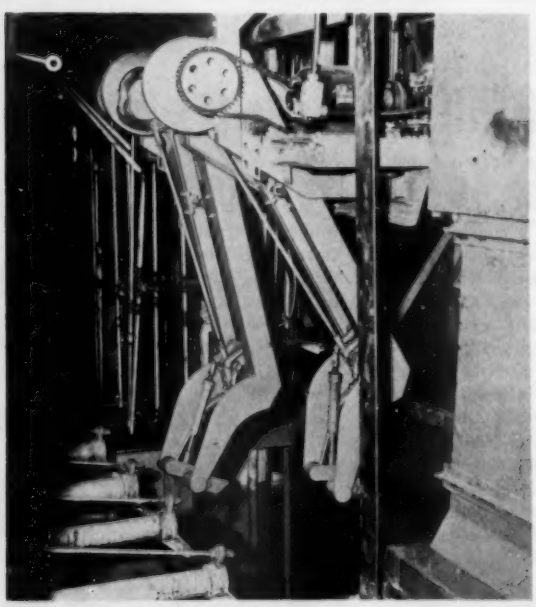
Where smaller installations must be used, but where the volume of parts is great enough to make completely manual operations much too expensive, a semi-automatic plating system is usually indicated.

In semi-automatic installations a mono-rail type of conveyor is used to transport the racks of parts from station to station. Cleaning, prior to plating, is done in still tanks and the operator must remove the racks from the conveyor and put them through the cleaning tanks. A small automatic plater is generally installed for the copper strike, copper and nickel plates. Chromium plating is again in still tanks, hand operated.

These semi-automatic systems require that all of the parts being handled receive almost identical treatment and, of course, the amount of labor involved is considerably greater than with fully automatic systems. They are, however, widely employed.



FULLY AUTOMATIC or semi-automatic systems of plating are both used. Shown above is a typical floor plan and layout for a fully automatic skip station system of plating. Cleaning, copper strike, copper plate, nickel plate and chromium plate are all included. Both hot and cold water rinses are used where necessary. When mixed loads are run that require different processing, the equipment can be set to skip any treatment tank desired. Loading and unloading of the racks onto the plating machine conveyor system is also fully automatic so that supervisory labor is all that is required in such a system. Parts come from degreasing already racked and go to other operations still on the racks. Unloading and loading is done elsewhere.



LOADING AND UNLOADING of the loaded racks is done automatically. The mechanisms are located alongside each other between the end of the chromium plating line and the beginning of the copper line. Actuated by a chain drive, they move reciprocally between the plating machine and an auxiliary conveyor. After unloading the racks move to picking stations where the plated parts are removed. The racks then cycle back to be re-filled with unplated parts. Rack stripping may be done before recycling.

TWO LOADED RACKS are carried by each conveyor arm of the system. After a rack is loaded, automatically, it follows a predetermined cycle of plating and rinsing. Dwell time in each tank can be individually controlled as can tank skipping. Since almost every stage in the plating cycle requires a different temperature and must be held within fairly close limits, automatic temperature control is essential on all tanks. Recirculation of the liquid in the tank is also constant as is filtration.

Illustrations, courtesy of Hanson-Van Winkle-Munning Co.

FOR SHORTER RUNS or when special finishes are to be used, fully automatic equipment may not be justified. In these cases semi-automatic operations may be employed. With such a system, material is moved from work place to work place by conveyor, but the individual operations performed at each station may be manual. Here metal baskets containing polished and buffed parts are being removed from a vertical conveyor and placed on a roller conveyor that will take them through a degreasing cycle. The degreaser is, of course, fully automatic.

RACKING is done by hand. The plating racks are suspended from an overhead mono-rail conveyor that completely encircles the finishing department. Cleaned and degreased parts are simply stored in their metal containers near to the racking area. These racks are 2½ ft. long and are designed to hold the parts through the entire finishing operation. Each part must, of course, have a special rack designed for it. In these semi-automatic systems the speed of the conveyor is not tied into plating speed, but rather into overall material movement through the plant.

COPPER PLATE is manually applied since these systems are normally set up to handle mixed work. The sequence is a correct cleaning treatment for the metal followed by a copper strike and then copper plate. Nickel plating is the first fully automatic operation. The racks are put on the carriers of a fully automatic plating machine. The racks move down one side of the machine, around the end and back down the other side. In this way there is no mass loading or unloading with waits in between for plating to be done. In the machine illustrated a complete nickel cycle is six minutes.

AFTER NICKEL PLATING the racked parts are manually removed from the machine, put through a drag-out tank and placed on the overhead conveyor. At the chromium plating line the parts are given an acid dip, again manually, and then placed in a semi-automatic chromium plating machine. After plating the parts are removed from the machine, manually dipped in a drag-out tank and then in a weak alkali rinse. Cold and hot water rinses follow to complete the operation. The conveyor moves the racks to unloading.

Illustrations, courtesy of Hanson-Van Winkle-Munning Co.

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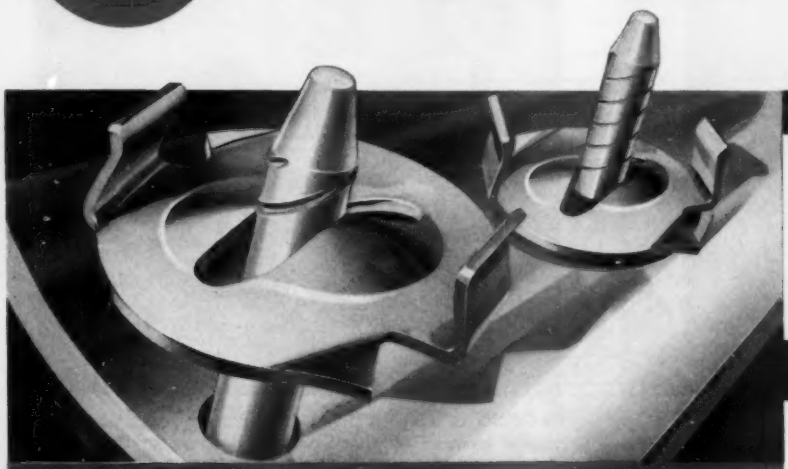

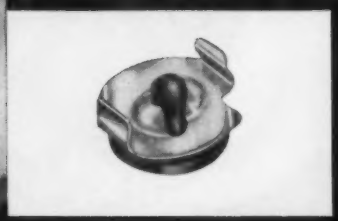

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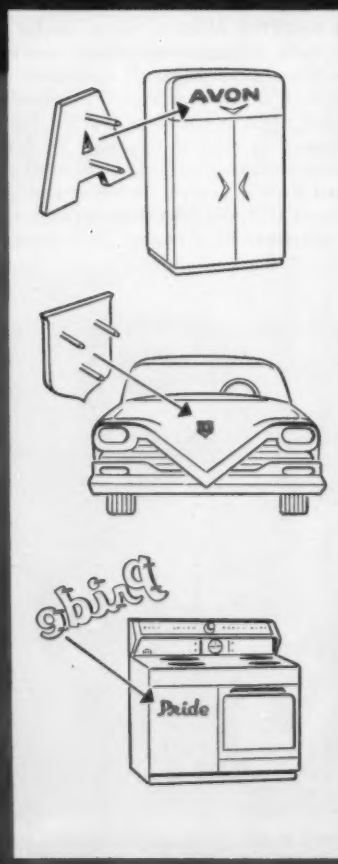

Nominal Sizes	A	B	C	D	E	F	Driving Torque	Ultimate Strength
1/8"	.560	.170	.450	6°/4°	.095 .085	.130 .125	7-10 Inch lbs.	200 lbs.
3/16"	.705	.200	.450	6°/3°	.160 .150	.192 .184	20-30 Inch lbs.	400 lbs.
1/4"	.875	.260	.625	6°/4°	.190 .180	.255 .245	25-30 Inch lbs.	500 lbs.

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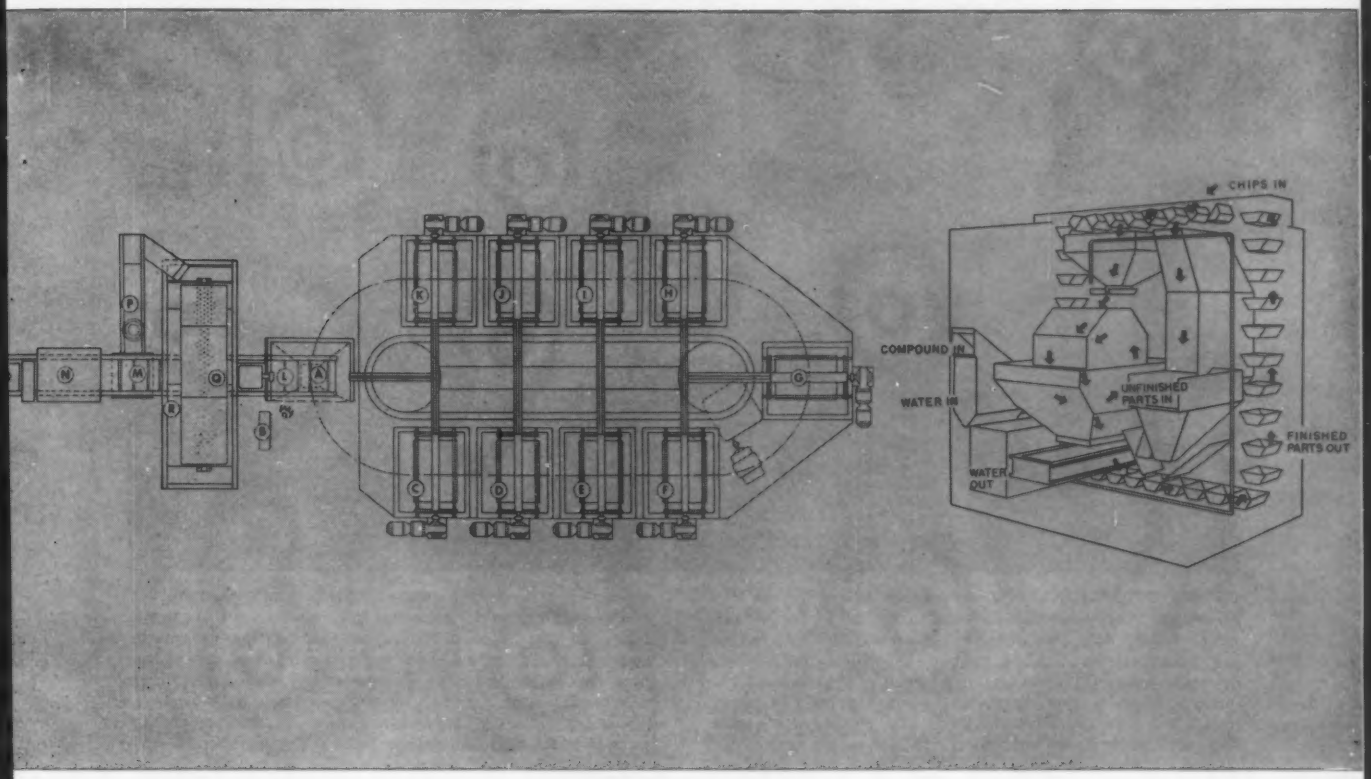


Automatic Barrel Finishing

Automatic barrel polishing lends itself most readily to the finishing of large numbers of small parts. Where it is necessary to rack the castings prior to barrel finishing, there is seldom any great saving to be effected by the use of automatic methods.

In general, an automatic barrel finishing set up follows one of two patterns.

For the in-line system, the same type or the same finish must be applied to all parts passing through it. If different kinds of parts are to be processed, they can be handled if the finish, the processing, and the timing are all the same.

The complete finishing process is automatic from beginning to end, controlled generally by one operator and a group of pre-set switches.

The finishing operations that can be performed include descaling, degreasing, grinding, deburring, burnishing, rinsing, and rust inhibiting of metal parts.

At the start of the cycle, the correct amount and size of abrasive media flow into the barrel from an overhead storage bin. The work parts are then charged into the barrel either manually or mechanically, and the door closed. As the barrel enters the system, it is raised from the loading and unloading stage and automatically traveled by conveyor to the beginning of the finishing line.

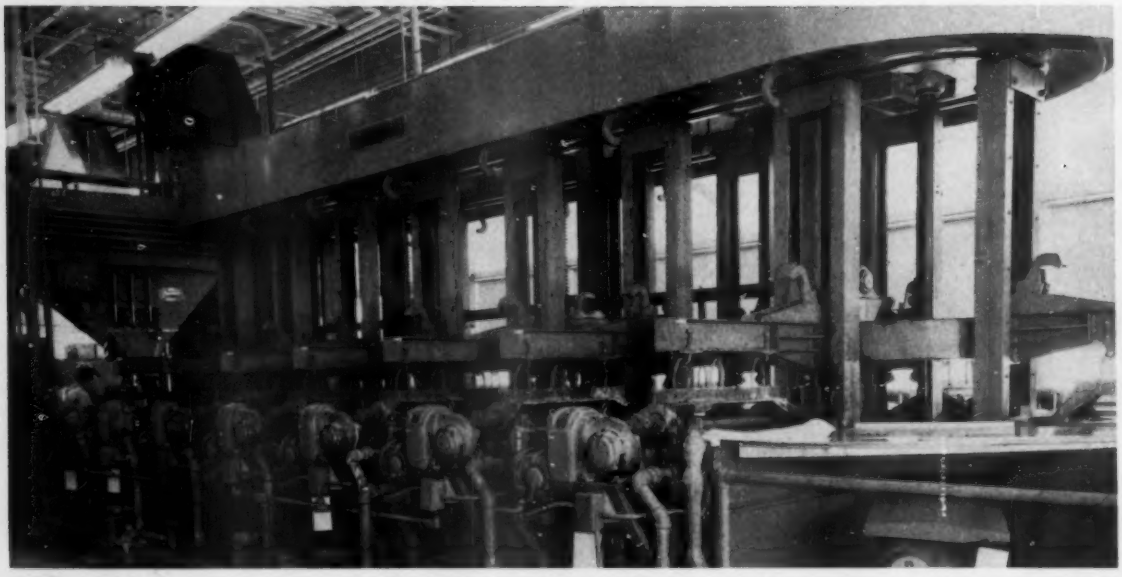
Usually an automatic walking beam alternately feeds two submerged type barrel finishing lines. Barrels in each line index simultaneously from one tank to the next at pre-determined time intervals. As the barrels pass from tank to tank, they are precision finished — in some cases with radii tolerances as little as 0.0005″ — and surface polished to a 10 microinch RMS or less.

These automatic barrel finishing lines may run from as little as five or six stages to 18 or more stages. Besides insuring uniform finish on the castings, remarkable savings are secured.

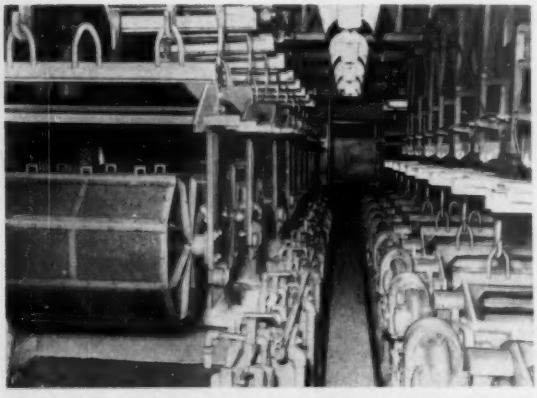
For example, to meet a daily production of 120,000 parts per working day, a two-line system with six tanks in each line was adequate. This system required three men as operators, where 59 operators previously had been used to finish the same number of parts.

Along with labor savings come comparable savings in media, compound, etc. Since the finishing solution remains in tanks, it is never wasted, and the flush-

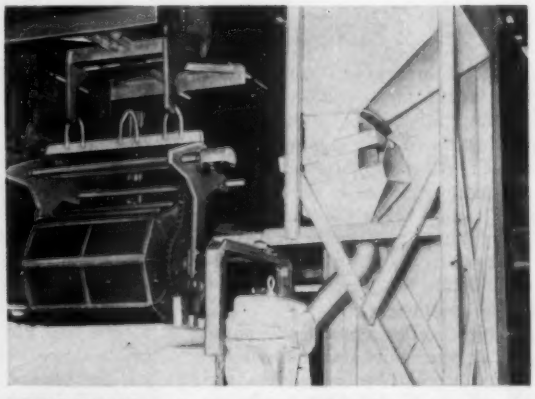
Continued on page 99



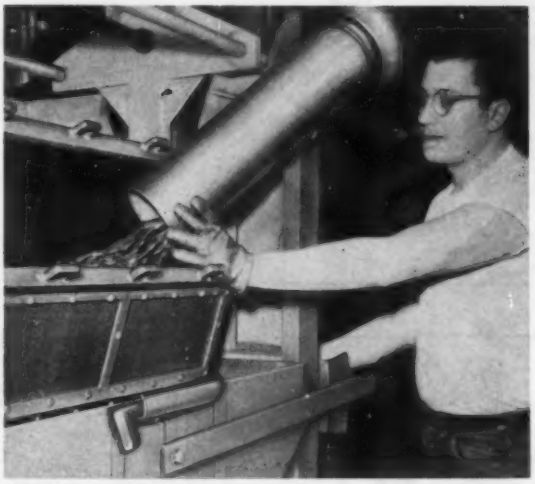
BARREL FINISHING can be automated as readily as any other finishing operation. Several different systems have been worked out. Two of these are shown on the preceding page; one an in-line system in which the barrels progress from station to station at each of which a different operation is done depending upon the type of compound used in the tank. Washing and rinsing are easily done in this type of equipment. In the other type illustrated (preceding page, right) a circulating load of abrasive is used with a constant flow of parts through the machine. Water and compound may or may not circulate. Above is a view of a 16 station skip-station automatic barrel finishing system. Loading and unloading are at the same end of the machine. Programming allows parts that require different finishing operations such as descaling, deburring, grinding, burnishing, coloring, rinsing, etc. to be in process simultaneously. Such a system can be operated by one man.



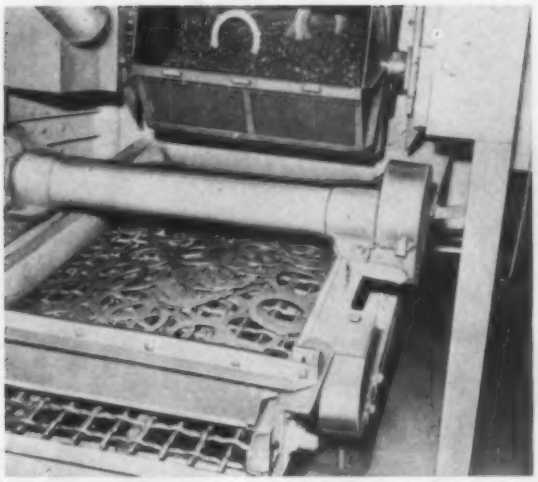
IN-LINE barrel finishing, in this case two nine station submerged systems. The barrels at the left side are in dwell position while draining prior to indexing to the next station. The barrels at the right are in the submerged position. Systems such as these are specifically designed for deburring and finishing high production parts of different kinds that require the same finish and processing. This system reduces the labor required for loading and unloading, time loss between barrel processing cycles and losses of compound. Micro-precision finishes can be produced at high production rates.



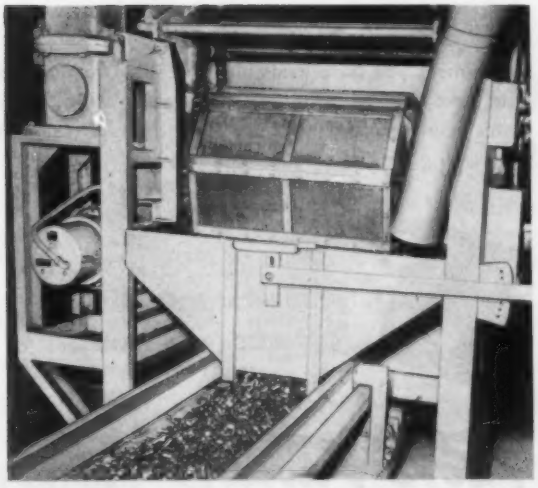
DISCHARGING and charging are largely automatic. As the barrel comes to the end of the polishing cycle it may pass through one or more rinse and anti-rusting tanks and then is allowed to drain. Discharge is onto some sort of screen or belt. The individual drive mechanism can be seen in this view. With a constant speed primary drive, the speed of rotation of the barrel can be easily changed by having a variable speed unit with which the primary drive mechanism engages. At the far right a portion of the mechanism for reloading the barrel can be seen. Parts and abrasive are carried in the elevator to the hopper from which they discharge to the barrel.



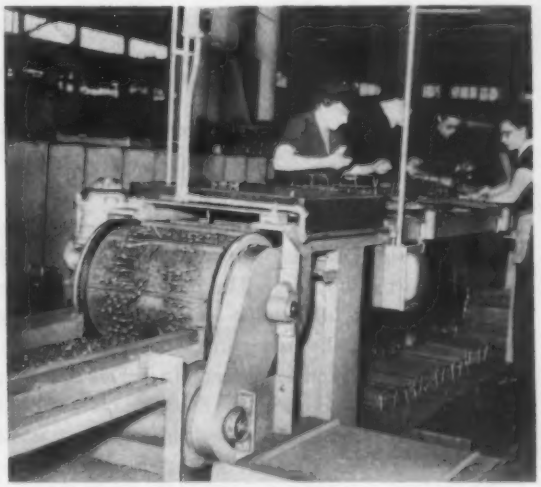
RECHARGING a barrel on a mechanized system preparatory to a new cycle. The operator is loading media with an air operated swivel chute which quickly meters a controlled amount of abrasive chips from an overhead storage hopper. This control of size and amount of chips of abrasive is only one of the safeguards provided to obtain exact uniformity of finish on parts so that every barrel load is processed exactly the same. The work load of parts may be discharged from an over-head hopper or may be charged from tote pans handled by an auxiliary lift device.



UNLOADING the work parts from the barrel onto a neoprene coated vibrating screen. The media falls through the screen while the work remains on it. Media is conveyed to a bucket elevator and then to an overhead screen classifier. In this way the media is kept properly sized at all times as an aid to the exact duplication of finish. In some cases where steel parts are processed the parts may pass through a rust inhibiting bath. A system such as the one being described can finish the parts shown at the rate of 3200 pieces per hour.



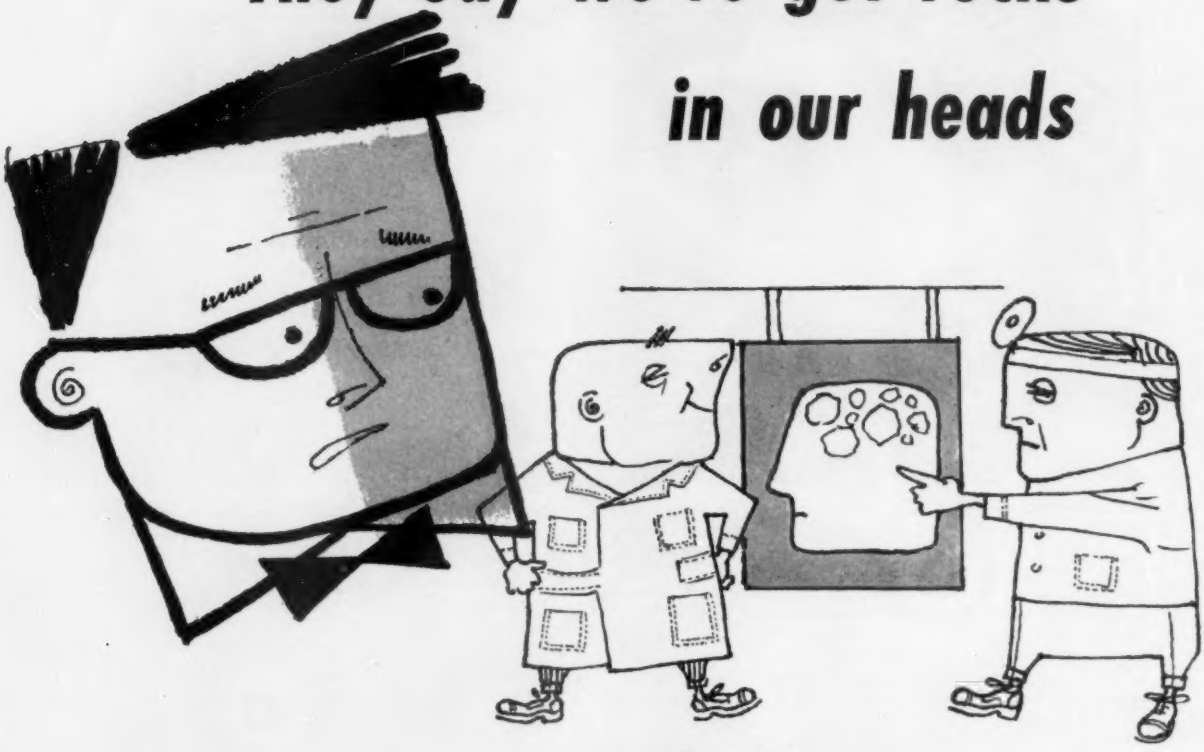
UNLOADING a barrel at the end of a cycle. A conveyor belt carries the media and work parts to a separator. If ferrous parts are being processed a magnetic separator may be used; if not, separation is on screens. Abrasive chips and media drop off the belt into the boot of a bucket elevator which carries them back to the loading hoppers. With these automatic systems the rate of production depends on the size of the parts to be finished and may run up to 120,000 pieces per day or higher. In the parts shown a radius of 0.001 to 0.0015 was applied at the above rate.



MAGNETIC SEPARATION of work parts is normally a part of the cycle when mixed loads must be accommodated. As the barrel finishes its cycle and returns to the loading-unloading station the media and parts are metered onto a conveyor belt which carries them to the separating line. Here the ferrous and non-ferrous parts are separated and placed in trays for delivery to either assembly or shipping. If they are to be plated they may go directly to that department.

Photos in this section courtesy of Almco Div., Queen Stove Works and the Roto-Finish Co.

They say we've got rocks in our heads



—and it's true!

We really don't mind this sort of talk. It's our business to have the types of "rocks" on our minds that are saving millions of dollars in the finishing of manufactured parts.

Roto-Finish people have studied abrasive chips and compounds since the day they pioneered the idea of precision barrel finishing. The development of new and better media for specific finishing problems has made Roto-Finish the leader in mechanical finishing. Years of research and experience in barrel finishing techniques give Roto-Finish the "know-how" to recommend the right media to do the job you want done.

If you're not satisfied with your finishing production, look to Roto-Finish for the answer. Simply send samples of your unfinished parts, a finished part, a description of your production requirements and a list of the equipment you have available. We'll prove that you can save with Roto-Finish and we'll guarantee the same results in your plant that are achieved in sample processing.

SEND FOR FREE
TECHNICAL DATA FOLDER
ON ROTO-FINISH PROCESSES

Roto-Finish
COMPANY
3716 Milham Road
Kalamazoo, Mich.

ROTO FINISH
Phone:
Fireside 3-5578

FOREIGN REPRESENTATIVES: CANADA — Toronto — Canadian Hansen & Van Winkle Co., Ltd., Cor. Silver and Morrow Aves. ENGLAND — Mark Road — Hemel Hempstead — Hertfordshire — Roto-Finish Ltd. AUSTRALIA — Cheltenham, 89 Tulip St., A. Flavell Ltd. HOLLAND — BELGIUM — LUXEMBURG — Delft, Holland — N.V. Roto-Finish Maatschappij Rotterdamseweg 370A ● AUSTRIA, GERMANY, SWITZERLAND, NORWAY, SWEDEN Frankfort a.M.—Metallgesellschaft A.G., Germany — Reuterweg 14 ● ITALY — Milan — Societa Roto-Finish a R.L. — Sesto S Giovanni — V.ale E. Marelli 31 ● FRANCE—Paris Societe Roto-Finish, 40-42 rue Chance Milly-Clichy, (Seine) ● BRAZIL — Rio de Janeiro — Commercial E. Industrial de Formos Werco, Ltda. rua General Gurjao, 326 ● SPAIN — Barcelona — Instituto Electroquimico, S.A. — Corcega 89.

For more information circle No. 116 on the Reader Service Card

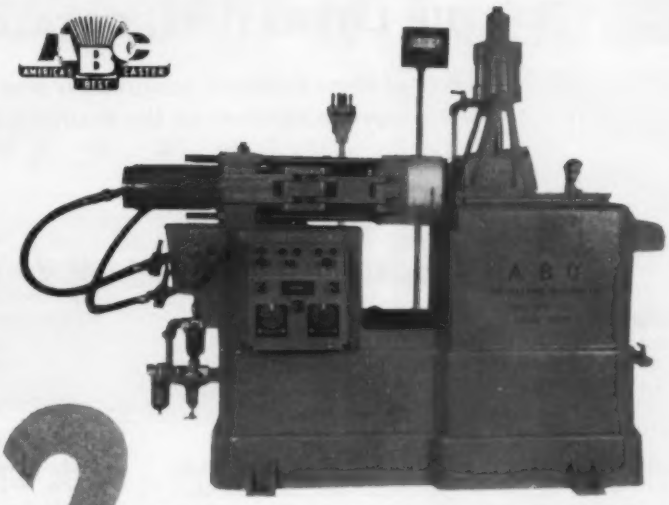
NEW CONTROLLER OF H-VW-M

George W. Stone

Hanson-Van Winkle-Munning Co., manufacturers of electroplating processes, equipment, and supplies, announced the appointment of George W. Stone as controller of the Matawan, New Jersey firm.

Stone was formerly with Allen DuMont Laboratories, Inc., of Clifton, New Jersey. Previously, he spent 12 years with Peat, Marwick, Mitchell and Co., Newark. He is a member of the National Association of Cost Accountants, Newark chapter. Mr. Stone attended New York University.

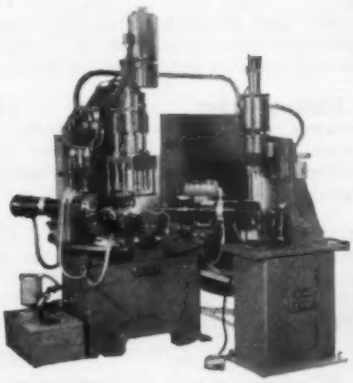
For more information circle No. 2 on the Reader Service Card



IS IT PRACTICAL TO USE A BIG MACHINE ON SMALL WORK?

Write today for engineering data and prices on our line of small die casting machines. Ask for Bulletin P 10.

ABC DIE CASTING MACHINE CO.
400 EAST 142nd ST. DOLTON, ILL.
(Chicago Suburb)



NEW SINGLE-OPERATOR DUAL MACHINE

FOR DRILLING AND TAPPING

How Govro-Nelson Automatic Drilling and Tapping Units can be used to speed up production can be seen in this two-position machine which incorporates 2 vertical and 5 horizontal units for drilling and tapping 12 holes in three similar parts.

Two holes are drilled in one position and ten holes are tapped in the second position.

The operator alternately loads the two machines, completing the drilling operations on a manually clamped fixture (right), and tapping ten holes simultaneously on the second machine (left), which automatically clamps, taps and releases the part.

Output: 300 parts per hour.

If you have similar operations and would like to speed up your production rate, send samples and part prints and we shall be pleased to recommend the proper Automatic Units or quote on a complete set-up. Literature sent upon request.

WRITE FOR Literature

Automatic DRILLING UNIT

GOVRO-NELSON CO.
Machinists of Precision Parts for 34 Years
1933 ANTOINETTE DETROIT 8, MICH.

For more information circle No. 107 on the Reader Service Card

USEFUL LITERATURE, CATALOGS, MANUALS

any of these technical publications may be obtained by circling the appropriate numbers on the Reader Service Cards, Pages 72-73

PMM PROCESSES

Die Service Failures: 154
Vanadium-Alloys Steel Co.—6 page reprint of an article "Service Failures of Aluminum Die-Casting Dies" by G. A. Roberts and A. H. Grobe. Discusses the three most common types of failures. Photomicrographs are used to illustrate the failures.

Copper Base Castings: 155
Aurora Metal Co.—6 page folder discusses the shell mold process as applied to copper base alloy castings. Typical applications, and development is included with illustrations.

Shell Molding: 156
Hooker Electrochemical Co.—8 page booklet. The important question of whether foundries should or should not enter the shell molding field is discussed. Illustrations and examples of foundries that did are included.

Molecular Bonding: 157
Al-Fin Div., Fairchild Engine & Airplane Corp.—20 page brochure. The latest design and technical data on a molecular bonding process, which has solved many different heat-transfer problems is presented. In this casting process aluminum and magnesium alloys are moleculary bonded to steel, stainless steel, iron and other metals.

Die Casting: 169
Universal-Cyclops Steel Corp.—8 page illustrated brochure. Technical data, stock sizes and other information on the company's facilities and products are described.

Investment Casting: 171
Walmet Alloys Co.—The latest issue of Metals in Brief, published by the company, contains items of interest to those in the investment casting field. Included is the latest stock list on alloys.

Zinc Die Castings: 177
New Jersey Zinc Co. An illustrated brochure presents a technical summary of the history of zinc die casting alloys. The latest issue the company's external house organ shows, in detail, the latest developments in pressure-casting zinc.

MATERIALS & EQUIPMENT

Hinged-Steel Belting: 162
May-Fran Engineering Co.—6 page multi-colored semi-technical bulletin MF-600 describes the company's complete line of hinged-steel belting. Five standard forms of the belting are presented with diagrams and charted specifications.

Aluminum Electrical Conductors: 163
Kaiser Aluminum & Chemical Sales, Inc.—Reference wall chart. All past and present code name designations for aluminum electrical conductors are brought together. 600 code names are listed alphabetically and type and size of products are specified. British, as well as U.S., standard tables are included.

Self-Filtering Cleaner: 164
Gulton Industries, Inc.—Detailed technical information is available on a new ultrasonic cleaner with a self-contained filtering system. The cleaner operates on a frequency of 40 to 44 kc and incorporates a forced air cooling system and has a cleaning tank capacity of one gallon.

Oil Extractor: 165
Poly Metal MT Co.—Illustrated literature is available on a new invention which improves oil reclaiming problems. The Poly Metal Oil Extractor allows one man to reclaim oil. The unit has a capacity of 600 pounds of cuttings yet weighs only 24 pounds.

Analytical Service: 170
Consolidated Electrodynamics Corp.—8 page bulletin. The company's mass spectrometer analytical service is described. Sample requirements and analysis are discussed. A price list is included.

Industrial Wire Cloth: 172
Cambridge Wire Cloth Co.—94 page illustrated catalog. Included is a description of the types and sizes of wire cloth available for industrial uses. Applications and useful metallurgical tables are furnished. A new section provides standard trade definitions.

Elbow Fittings: 173
Aeroquip Corp.—4 page folder describes hose elbow fittings that simplify hose installation in confined spaces. Pictures and complete data tables are included.

Metalworking Bibliography: 174
Aluminum Company of America—"Bibliography of Information about Aluminum for the Designer" lists all available literature and motion pictures available from the Company.

Oilless Coolant: 175
Harry Miller Corp.—8 page booklet. Describes an unusual liquid that acts as a coolant, lubricant and rust preventative. It is described as being especially effective on hard and soft steels and other ferrous metals.

Machine Clamp: 176
Universal Vise & Tool Co.—8 page illustrated booklet. A new machine clamp, Clamp-N-Jack Set-Up System, for use with boring mills, planers, milling machines, presses and drill presses is presented in catalog 557. Typical applications on various types of machine tools, and actual experience data with the system are included.

FINISHING

Copper Anodes: 158
Chase Brass & Copper Co.—Information is available on the company's new forged ball anode that features more weight, longer life, smoother surfaces, and uniformly dense structure.

Continued on page 96

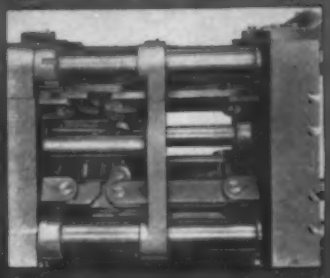
Your Good Judgment is Confirmed When You Buy . . .

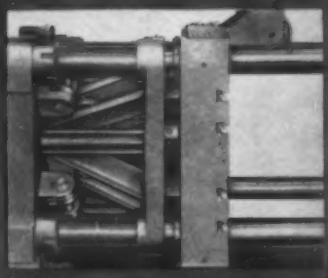
B&T DIE CASTING MACHINES

In many industrial centers you'll find leading die casters using B&T die casting machines — purchased by smart production men who, having carefully investigated and compared, choose them in preference to all others. These men know that for castings of extreme accuracy, excellent density and finish, B&T Die Casting Machines can not be beat. And, furthermore, that they'll give you top production with a minimum of maintenance.

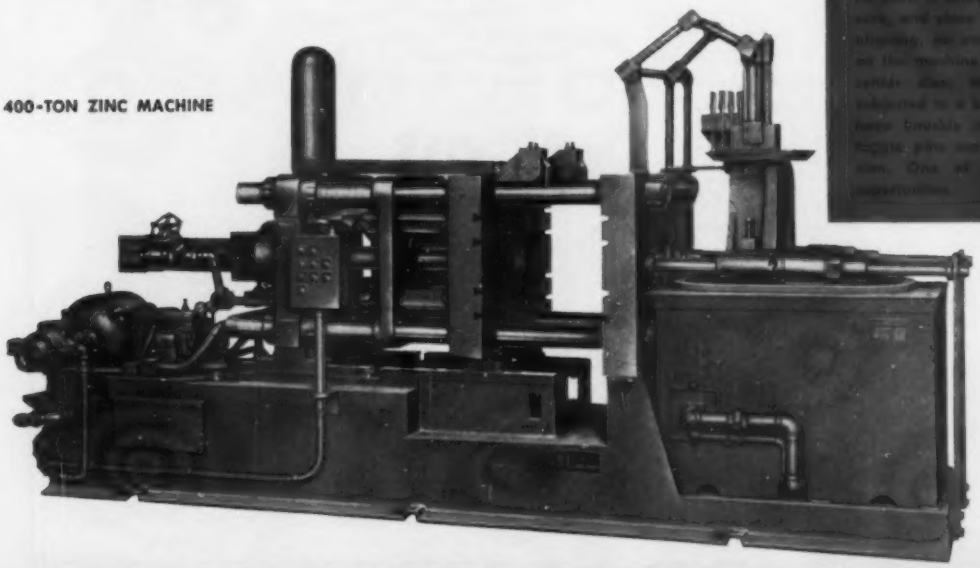
13 MODELS thoroughly proved by many years of actual service — ranging in capacity from 100 to 750 tons — for zinc, aluminum and brass. EACH DESIGNED AND BUILT TO THE SPECIFICATIONS OF PRACTICAL DIE CASTERS AND DEVELOPERS OF DIE CASTING MACHINES WITH OVER 35 YEARS OF EXPERIENCE.

THE *Only* DIE CASTING MACHINES *with* 4-TOGGLE, SELF-ALIGNING LOCK-UP . . .





400-TON ZINC MACHINE



Write FOR BULLETINS GIVING DETAILED INFORMATION

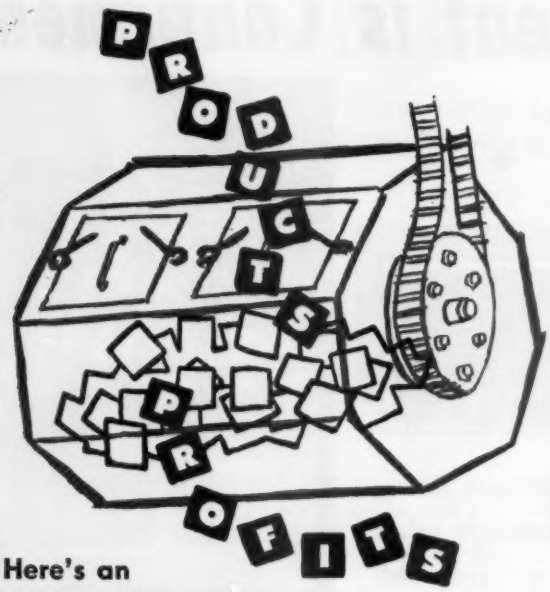
B&T MACHINERY COMPANY 301-317 HIGHTH ST. HOLLAND, MICHIGAN PHONE 2341

BUSS

AN AFFILIATE OF BUSS MACHINE WORKS • MANUFACTURERS OF MACHINERY SINCE 1862

Represented in Canada by Upton Braedeen & James, Ltd.

For more information circle No. 20 on the Reader Service Card



Here's an exciting new game:

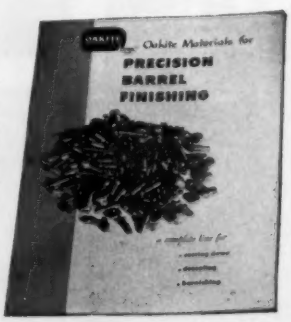
PUT your products in the barrel
TAKE your profits out

One of the greatest money-saving opportunities in metal-working lies in the use of barrels to finish parts by the hundreds in place of conventional methods that finish one part at a time.

Barrel finishing makes easy work of many tough jobs of grinding, deburring and buffing by wheel.

One Oakite customer changed to barrel methods to deburr curved stainless steel strips that are 14 inches long. The cost for deburring 20,000 strips was reduced from $3,000 to $125.00.

FREE For a copy of *"Precision Barrel Finishing"*—containing valuable information on cutting down, deburring, descaling, and burnishing—write to Oakite Products, Inc., 34G Rector St., New York 6, N. Y.



OAKITE

Export Division
Cable Address: Oakite

Technical Service Representatives in Principal Cities of U. S. and Canada

For more information circle No. 114 on the Reader Service Card

USEFUL LITERATURE

continued from page 94

Electroplating: 159

Enthone Inc.—Information is available on two new processes. The Enbond "Z" process for the treatment of zinc base die castings utilizes a carefully formulated and balanced anodic electrocleaner and a companion acidic activator to produce a uniformly active surface ready for a standard copper plating operation. Enbond "BR" process is similar in nature to the "Z" process, but is intended for preparation of brass and other copper alloys for any type of electrodeposit.

Rust Remover: 160

Turco Products, Inc.—4 page folder. The illustrated folder describes the company's Alkaline Rust Remover, a chemical compound that removes rust, paint and primer from metal surfaces in two simple steps without the use of acids.

Acid Inhibitor: 161

Enthone, Inc., Subsidiary of American Smelting and Refining Co.—Detailed information is available on a new inhibitor for use in acid solutions. The inhibitor can be used on high carbon steel without the dangers of etching.

Fasteners: 166

Carr Fastener Co., Div. of United-Carr Fastener Corp.—64 page composite engineering data catalog. Catalog No. 57 presents illustrated data on products which are representative of the company's different lines of specialized fasteners and allied devices.

SPEED UP PRODUCTION WITH DOUBLE-ACTION DRYING

Air-dry as you spin-dry with new, improved New Holland Model 20

KREIDER Centrifugal DRYER

Double-action cuts costs way down—gives smooth, moisture-free surfaces... eliminates scarring and marring frequently responsible for costly "rejects."

Specifications:
1-h. p. motor—220, 440, 550 volts—2- or 3-phase. Spins 75-lb. loads at 825 r.p.m.
Quiet U-belt drive. Arc-welded steel plate construction. Weight 490 lbs. Requires minimum floor space.
Meets N.E.C. specs. Auxiliary electric or steam heating units available as optional equipment. 3 models.

Send for illustrated 4-page folder. Address Dept. 579-M

NEW HOLLAND MACHINE COMPANY
NEW HOLLAND, PA.

For more information circle No. 112 on the Reader Service Card

Automotive Fasteners: 167

Carr Fastener Co., Div. of United-Carr Fastener Corp.—22 page catalog. A complete catalog on the fasteners that are standard replacement parts. Illustrated and complete with all data specifications.

Inserts: 168

Heli-Coil, Div of Topp Industries—4 page illustrated external house organ describing the company's products and services. Other bulletins available from the company are described.

Finishing News: 178

Oakite Products Inc.—The latest issue of the company's news bulletin is out. Featured are "Two Million Fasterers A Day" and new products and developments in the industry.

Fastener-Seal: 179

Parker-Kalon, Div. of GATC.—Detailed information is given on a new "controlled-flow fastener-seal. Called Nyltite Staps, the fastener consists of a self-conforming nylon washer preassembled to a standard self-tapping screw. The washer compresses against the head and threads of the fastener as the screw is turned and thus seals the opening.

Trimming Presses: 108

Hannifin Corporation.—The brochure describes the trimming action possible only with the company's product, and lists the special design features. Detailed information is given with illustrations on nine of the models and special purpose presses.

Continued on next page

Poor Paint Adhesion?

Free Manual

SHOWS HOW
PHOSPHATING
WILL SOLVE
YOUR PROBLEMS

If poor paint adhesion is your problem, chances are you'll find the solution in the Turcoat Phosphating Manual. This booklet describes the complete Turcoat line, tells the full story of phosphating and includes a valuable "Phosphating Reference Chart," which gives the answer to any paint adhesion problem.

TURCO

TURCO PRODUCTS, INC.

Chemical Processing Compounds

6135 So. Central Ave., Los Angeles 1, Calif.
Factories: Newark, Chicago, Houston, Los Angeles

Offices in all Principal Cities

Manufactured in Canada by B. W. Deane & Co., Montreal

For more information circle No. 117 on the Reader Service Card

DURACOAT®

for Die Castings

UNTREATED

DULL

CHEMICALLY POLISHED

BRIGHT

PROTECTED

GOLDEN COLOR

For chemically polishing, deburring and protecting zinc and aluminum die castings

DURACOAT® DCP-3 and -5. Zinc die cast parts can now be chemically polished by simple immersion. Costly hand or mechanical operations can be eliminated or supplemented with these solutions. Use for reclaiming stripped parts; prior to plating for brighter deposits and increased throwing power into low current density areas, and as a final finish.

CHEMBURR® 3 and 5. For chemically deburring zinc die castings. Eliminates costly mechanical tumbling and hand deburring operations. Internal holes and threaded sections completely deburred and chips removed by simple immersion.

DURACOAT® C. Liquid chromate product for producing bright, irridescent or golden protective finish on zinc die casting. Fast, simple, economical to use. Highest quality at lowest cost.

ALCHROME® #1 and #2. Clear or yellow golden chromate finish for aluminum. Outstanding protection. Can be used to replace anodizing where hardness is not a requirement.

All DURACOAT® products meet existing military specifications.

Write for free technical data sheets describing products in detail. Send samples for free processing.

HEATBATH
CORPORATION
Springfield 1, Mass.

or 701 North Sangamon Street, Chicago 22, Illinois

34 Years of Service to the Heat Treating and Metal Finishing Industry

For more information circle No. 109 on the Reader Service Card

For more information circle No. 103 on the Reader Service Card

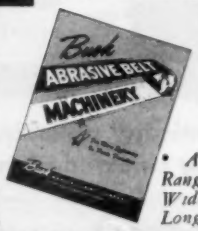
For Efficiency in Parts Finishing

Model PG 300 Pedestal Grinder 3" W. x 132" L. Belt provides a new approach to platten and contact wheel applications.

Bush Abrasive Belt Machinery

Offers experience in the design and manufacture of special and standard abrasive belt grinding and polishing machines. Any finishing job requiring grinding or polishing is efficiently handled by a complete line of:

Bench & Wall Belt Grinders •
Adjustable Tongue Sanders •
Swing Sanders •
Horizontal Belt Grinders •
Glass Seaming Belt Grinders •
I.D. and O.D. Grinders •



• *Abrasive Belt Range ¼" to 10" Wide x 90" to 168" Long.*

Bush MANUFACTURING CO.

900 Rochester Road, Clawson, Mich.
Telephone Juniper 8-3737

Brush Plating: **180**

Dalic Metachemical Ltd., 4-page reprint. The "Dalic Process" of brush plating is described. Characteristics of the plate, new solutions, equipment and operation, and applications are discussed in detail. The booklet is illustrated with photographs and charts.

Barrel Finishing Equipment: **181**

Casalbi Co., Globe Div., 20-page catalog. Information on all types of abrasive and burnishing media and necessary compounds is given in the company's new general catalog. Included are important facts about six variables in barrel finishing.

Ultrasonic Cleaner: **182**

Alcar Instruments, Inc., single-page data sheet. The company's Model 3009 ultrasonic cleaner for laboratory or production cleaning of "hard-to-clean" parts is described. Complete specifications are given on the unit, a portable cleaner designed for continuous commercial use.

Aluminum Polishing, Anodizing: **183**

Colonial Alloys Co., Technical Processes Div., two illustrated folders. Form No. 12449-1 describes the company's "Mirrodip" chemical polishing process, claimed to save up to 50 percent on polishing costs. Typical applications are illustrated. Form 453 describes the "EC" anodizing process for aluminum and its alloys.

Chromium Diffusion: **184**

Chromalloy Corp., 4-page reprint. Bulletin No. 21 describes "Chromallizing," a chromium diffusion process which imparts heat, wear, and corrosion resistance to low carbon steels, allowing them to replace more costly alloys with equally satisfactory performance results.

Pangborn Hydro-Finish cut cleaning time 50% in this plant

Paid for itself in only six months

Pangborn Hydro-Finish really paid off for this leading glass manufacturer. Cleaning quality increased moldlife 10% to 15% and total cleaning and polishing time was cut in half! The resultant savings paid for the machine in six months and represented a substantial weekly sum thereafter.

USE PANGBORN HYDRO-FINISH FOR:

Deburring • Surface finishing • Finishing threaded sections • Improving cutting tool life • Maintaining dies and molds • Removing grinding lines • Removing heat treat scale • Preparing surfaces

Today, through new design and use of air jet sluriators, Pangborn Hydro-Finish costs less originally, costs less to maintain and gives you easier handling and added efficiency. Write for Bulletin 1403 to PANGBORN CORP., 3500 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn
BLAST CLEANS CHEAPER

For more information circle No. 115 on the Reader Service Card

BARREL FINISHING

continued from page 89

ing and recharging of barrels is completely eliminated. At the unloading station the parts and abrasive media are emptied from the barrel onto a belt conveyor.

Where non-ferrous parts are involved, as is always the case with die castings, the finished castings and the polishing media pass over a vibrating screen where the bulk of the media is removed. From here the parts may go to a dryer and then to a pick-off table or into baskets for transporting to other finishing areas.

The other type of automatic barrel finishing equipment depends upon the flow of parts through the machine, rather than moving the barrel from station to station. These machines are considerably newer than the in-line type and utilize a bucket conveyor into which the unfinished parts pass.

The conveyor carries these parts to a hopper above the barrel, which rotates in a tank containing water and compound. After a pre-determined period of rotation, the barrel automatically opens, discharges the parts and media onto a vibrating screen where separation occurs, and the finished parts are carried outside the machine.

This type of equipment is equally adaptable to high speed production with about the same economies as the in-line installations.

As an example of the economies possible with the type machine just described, on a deburring operation using a 30-minute tumbling cycle, 3,000 pieces per hour can be handled automatically.

It is possible that this type of equipment is not quite as economical in its use of water and compound as the in-line type, but that can vary considerably with the different installations.

NEW DISTRICT MANAGER

Ralph A. Petersen has been appointed manager of the new Birmingham, Alabama, district office of the Pangborn Corp., of Hagerstown, Md. The company manufactures Rotoblast and dust control equipment.

Petersen recently joined the Pangborn Corp. as a sales engineer. His territory includes Alabama, Mississippi, and eastern Tennessee.

now you can get this brilliant finish directly on zinc die castings!

No electroplating--no mechanical finishing!

TREATED WITH NEW IRIDITE

NEW IRIDITE (Cast-Zinc-Brite)

brightens zinc die castings by chemical polishing, protects against corrosion

NOW, FOR THE FIRST TIME you can get a brilliant, decorative finish directly on zinc die-cast parts . . . without mechanical finishing, without electroplating! The luster is provided by the *chemical polishing* action of new Iridite (Cast-Zinc-Brite) solution. Even surface blemishes, such as cold shuts, are brightened by this new process. No electrolysis. No special equipment. No specially trained personnel. Just a simple chemical dip for a few seconds and the job is done. And, this new Iridite has been *tested and proved* in production.

CORROSION RESISTANCE, TOO! New Iridite (Cast-Zinc-Brite) provides exceptional corrosion resistance for bright-type chromate finishes . . . also guards against blueing or darkening by eliminating zinc plate formerly required in bright chromate finishing of zinc die castings.

AS A BASE FOR ELECTROPLATING—Lower mechanical finishing costs are possible where plated finishes are *required* since the brightness provided by this new Iridite may be sufficient.

LET US SHOW YOU what Iridite (Cast-Zinc-Brite) can do for you. Send us at least a half-dozen typical zinc die-cast parts for FREE PROCESSING for your own tests and evaluation. Or, for immediate information, call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified 'phone book. *IMPORTANT: when you give us samples for test processing, please be sure to identify the alloy used.*

Iridite is approved under government specifications

ALLIED RESEARCH PRODUCTS
INCORPORATED
4004-06 E. MONUMENT STREET • BALTIMORE 5, MD

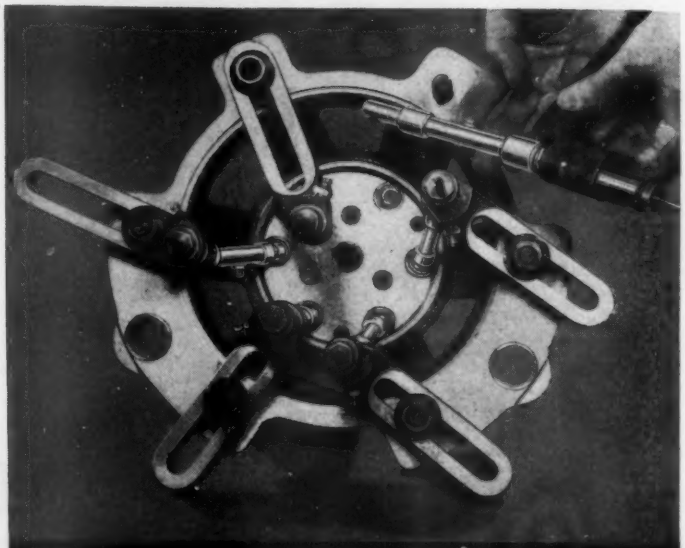
Manufacturers of Iridite Finishes for Corrosion Protection and Paint Systems on Non-Ferrous Metals; AEP Plating Chemicals

For more information circle No. 99 on the Reader Service Card

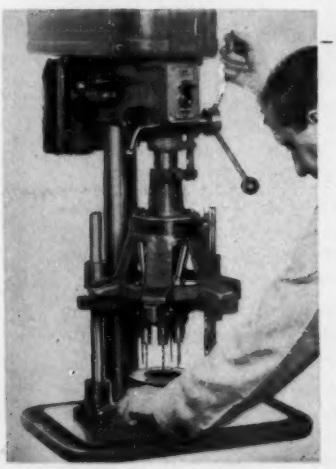
Here's how you can drill or tap
OVER A MILLION DIFFERENT HOLE COMBINATIONS
on any drill press in any operating position!

NEW Ettco-Emrick

Universal Ball Joint Adjustable Spindle MULTIPLE DRILLING AND TAPPING HEADS



Underview of Ettco model 600 head showing spindles, adjusting arms and locking nuts. Note alemite grease nipples for fast one shot lubrication. Each grease nipple and universal ball joint is equipped with Neoprene cover (not shown) to keep lubricant in.



Model 600 (6-spindle circle type) head set up for drilling on a standard drill press — one of three models, circle or straight line types.

Featuring Ettco's exclusive
Lubricated Ball Joint with Neoprene Covers

These unusually versatile, smooth-running heads give you the dependable, high-production accuracy needed for most small hole drilling and tapping operations. Glance at some of the built-in advantages that make these compact light weight heads such an outstanding development:

Wide range of spindle settings: Fast and easy to locate in almost any pattern, even while running. Excellent rigidity, too.

Add or remove spindles quickly: That's because they're keyed into the gear case. They're interchangeable on all three models.

Tap or drill capacities up to 5/16" in steel: Each spindle capable of transmitting 1/2 H.P.

1:1 ratio of drive to spindle: Ideal for production tapping.

No reversing motor needed: Attach to any drill press with standard Ettco face plate — they're ready to work without special engineering.

Long trouble-free service: Durable chrome-nickel spindles are one-shot lubricated and run in oilite bushings for smoothest performance.

And 100% guaranteed to do the job they're made for!

Want more details? Write today for bulletin 600B. Authorized Ettco distributors throughout the U. S. and Canada

The only full-line manufacturer of drilling and tapping equipment for the entire small hole field

ETTCO TOOL & MACHINE CO., INC.
586 Johnson Avenue, Brooklyn 37, N. Y.

Chicago • Detroit • Los Angeles • Indianapolis • Hartford • Houston

TAPPING ATTACHMENTS • MULTIPLE HEADS • STANDARD AND SPECIAL DRILLING & TAPPING UNITS AND MACHINES • INDEXING FIXTURES

For more information circle No. 106 on the Reader Service Card

NEWS OF INDUSTRY & ASSOCIATIONS

activities of people, companies & groups in the precision metal molding industries

FORMER HEAD OF AS&R ROGER W. STRAUS DIES

Roger Williams Straus

Roger Williams Straus, who retired from his post as chairman of the Board of American Smelting and Refining Company in April, died on Sunday, July 28. He was 65 years old.

Mr. Straus was born in New York City, the son of Oscar S. Straus, Secretary of Commerce and Labor in Theodore Roosevelt's cabinet. He joined American Smelting in 1914, was made a Director in 1916, and was elected President in 1941. He served in that capacity until 1947, when he became Chairman of the Board, the position from which he retired this year. At the time of his death, he was a Director of the Company, and also of Revere Copper and Brass, Inc., General Cable Corporation, New York Life Insurance Company and New York Telephone Company. He was Chairman of the Executive Committee of Revere and the General Cable Corp.

NEW LINDBERG DIVISION HEADED BY MUELLER

C. A. Mueller

Lindberg Engineering Company, Chicago, announced that Charles A. Mueller has been named Chief Engineer of the new Gas Process Division. This division will handle the development of atmosphere gas generation processes not only for heat treating, but also for the food and chemical industries.

ELECTED PRESIDENT OF NEW R-N CORPORATION

Dr. Alex Stewart

Dr. Alex Stewart, formerly director of research for National Lead Company and supervisor of the company's atomic energy activities, has been elected president and general manager of R-N Corporation, owned equally by National Lead Company and Republic Steel Corporation.

The new organization, with headquarters at 111 Broadway, New York City, controls a direct reduction process for producing high-metal iron products through the treatment of natural iron ores, the use of which can be obtained by other companies through a license agreement.

DU-WEL DECORATIVE CO. ANNOUNCES NEW PLATING & FINISHING PLANT READY

Du-Wel Metal Products Company has announced that the plant for their new plating and finishing division, known as the Du-Wel Decorative Company, will be in full operation in October. This new division will be devoted exclusively to plating and painting zinc die castings. Du-Wel has been furnishing plated parts to the trade for a good many years but has always had to purchase the finishing work. For the past five years management studied the feasibility of adding the finishing facility and, after this study, decided in early 1957 to start this new project.

The copper, nickel, and chrome plating will be done with a Hanson automatic plating machine, which has an output of 100 racks per hour. Added tanks for color plating have also been included, as well as spray booths for paint finishes as they will be required. A complete buffing department has also been installed and includes the usual hand jacks, plus several machines for automatic polishing and buffing.

The entire plant has been set up on as completely an automatic basis as possible to keep production costs low. Conveyors take the material away from the buffing department to a degreasing machine, and on to a loading station for the plating machine. There the castings are transferred to the plating equipment and are again removed after the plating cycle is completed to go to the inspection or painting department as required. The basic plant is set up to meet specifications for appliance use and indoor automotive applications. The Company plans to add an additional automatic line for outside specifications at a

Continued on page 102

later date. The equipment is designed to handle extremely small castings up to parts forty-two inches long.

Du-Wel undertook this major expansion because of the increasing market demand for a completely integrated casting and plating operation.

It is also self-evident that with an integrated finishing facility much handling is eliminated, scrap reduced, and basic efficiency increased. It is quite possible in this new plant to pack finished parts within one hour after they have been cast.

The plating building is connected to the die casting plant at the south end of the plant. This plating addition includes 8,000 square feet and is divided into three sections: A buffing room, the plating department, and the painting area. Additional space for office and laboratories is also included. The cost of the added building was $35,000 and the cost of the machinery and equipment exceeded $100,000.

A partial interest in this new plating division is owned by the Ohio Decorative Products in Spencerville, Ohio. This firm has been in the plating business for several years and has made available all of its technical knowledge in setting up this modern plating plant.

Du-Wel has announced that they anticipate sales during the first twelve months of operation which will exceed $400,000 in finishing services. It is planned within a two year period to increase annual sales to at least $1,000,000.

Because of the added plating facilities, Du-Wel Metal Products, Inc., has purchased a 4,000 square foot cement block building adjacent to their present 7 acres of land for use as a storage facility and for light assembly work. This property is located on the south side of the present plant site and will give an exit on another street. The cost of this new building, with added improvements, will amount to $15,000.00. The building will be known as Plant #3, and the plating division will be known as Plant #2.

Inexpensive Air Clamps

REDUCE LOADING— UNLOADING TIME

The illustration above shows a group of fixtures in the plant of Romec Pump Division of Lear, Inc., built around the Bellows Han-D-Air Cylinder. Romec estimates they have reduced clamping costs by a third in more than 75 machining operations through the use of this small, but powerful, air cylinder.

Available from stock in both single and double-acting models, in 1⅛" bore size, and in stroke lengths of 1", 2", 3" or 4". They can be mounted in any position. A threaded 5/16" piston rod simplifies installation. At average shop air pressures it develops 80-to-100 lbs. of thrust. Its cost is so low it is less expensive to leave the Han-D-Air permanently on the fixture than to switch it from one fixture to another.

Write for information and prices on the Bellows Han-D-Air Cylinder. Address Dept. PMM957. The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

895-B

The Bellows Co.
AKRON 9, OHIO

For more information circle No. 101 on the Reader Service Card

STELLA PRODUCTS CORP. NAMES NEW PLANT MGR.

Waite W. Broughton

J. G. Stellas, president of Stella Products Corp. Livingston, New Jersey, announced the appointment of Waite W. Broughton as Plant Manager.

Mr. Broughton has been active in the die casting industry for the past twenty years.

This appointment represents one of the first steps in the company's expansion program.

COLWELL CITED BY ASTM

Donald L. Colwell, well-known to the die-cast and foundry industries, and director of laboratories for Apex Smelting Company, Cleveland, has been cited with an Award of Merit by the American Society for Testing Materials.

The honor was given Mr. Colwell "in recognition of sustained and valued contributions in various standardization and research programs." The citation referred to his work on die-cast metals and alloys and to other long-time service including district activities of the Society.

Mr. Colwell has been associated

with Apex Smelting for 12 years, initially as sales engineer. Previously, he was associated as metallurgist and later sales manager for Stewart Die Casting Division of Stewart Warner Corporation.

CARPENTER PROMOTES TWO METALLURGISTS

Two metallurgists have been promoted to new positions by The Carpenter Steel Co., Reading, Pa.

Basil T. Lanphier, metallurgist for stainless and high temperature alloys, has been named manager of research. Howard O. Beaver, formerly plant metallurgist-melting, is promoted to production metallurgist in charge of melting and hot working.

He is a member of The American Society for Metals, serving on the executive committee of the Lehigh Valley Chapter. He also currently serves on the physical chemistry of steel making committee and the electric furnace steel committee of the American Institute of Metallurgical and Mining Engineers. He represents Carpenter on the A.I.S.I. electric furnace steel committee.

DeVILBISS PURCHASES NEWCOMB-DETROIT

The DeVilbiss Company has announced an agreement to purchase the Newcomb-Detroit Company, a pioneer in the design. manufacture and installation of custom-built finishing equipment.

Describing the acquisition as a move which will strengthen both companies, Howard P. DeVilbiss said Newcomb-Detroit will remain a corporate entity and be operated as a subsidiary of the DeVilbiss Co.

Newcomb-Detroit designs, manufactures and installs industrial ovens. heavy-duty waterwash spray booths, parts washers, dust collectors and a wide variety of kindred equipment, metal-cleaning and rustproofing machines, pickling units, dip systems, continuous or intermittent conveying systems, flow coaters and replacement air systems. In addition to custom installations, the company also furnishes individual units.

These products supplement and complement the DeVilbiss line of spray-painting and finishing equipment for industry and will henceforth be marketed through DeVilbiss' widely known international sales organization.

Originality and economy are compatible . . . at ARWOOD

INVESTMENT CASTING is one of the few production processes that caters to the creativeness of a design engineer. No more frustration caused by the limitations of conventional processes. And . . . without sacrificing production economy, either!

If application requirements demand that a part be of intricate shape and unusual contour, of metals difficult or impossible to machine, INVESTMENT CASTING provides the efficient and economical solution to your design and production problems.

CASE IN POINT

FREEDOM OF DESIGN. This steel hinge was formerly a complicated assembly composed of a stamped bracket and machined hinge welded together. With investment casting the engineer was able to design the part for utmost efficiency as a single piece with substantial savings in production costs.

A New Service for YOU!

ARWOOD offers a complete finish-machining service, for your convenience. All Arwood plants can now furnish finish-machined castings to your specifications.

For complete information on Investment Casting and the name of your nearest ARWOOD Engineering Representative, write TODAY to:

ARWOOD

ARWOOD PRECISION CASTING CORP.

323 West 44th Street, New York 36, N. Y.

PLANTS: Brooklyn, N. Y.— Groton, Conn. — Tilton, N. H. — Los Angeles & N. Hollywood Way, Calif.

"PIONEERS IN INVESTMENT CASTING"

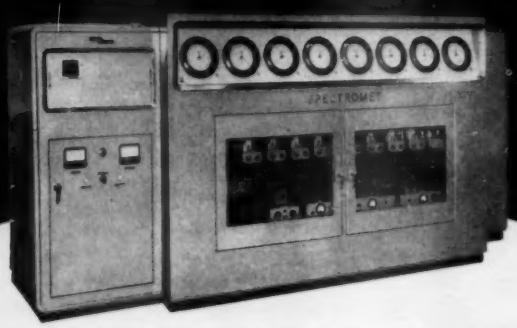
For more information circle No. 16 on the Reader Service Card

How can Analytical Equipment squeeze out more profit dollars?

By making rapid, accurate analyses — in seconds — on the production floor!

By eliminating losses caused by off heats!

By using the *Baird–Atomic* SPECTROMET!!!



Analyses of metals in production maintains a constant high level of quality control, at a production rate requiring minimum furnace time.

Another plus — the savings in alloys. The B-A Spectromet provides percent concentration within 60 seconds, thus less alloying materials are lost during meltdown. Speed and accuracy are inherent features of the B-A Spectromet.

The moment spent to write for full details will be well rewarded.

BAIRD ATOMIC

Baird-Atomic, Inc.

33 UNIVERSITY ROAD, CAMBRIDGE 38, MASS.

For more information circle No. 21 on the Reader Service Card

REPRESENT B&T MACHINERY IN TORONTO, CANADA

B&T Machinery Company of Holland, Michigan announce the recent appointment of Upton Bradeen & James, Ltd. of Toronto, as their exclusive representatives in Canada. The B&T die-casting machines for zinc and aluminum are built in sizes from 100 to 800 tons of clamping pressure. An illustrated brochure showing the various models is available.

3M OPENS NEW CLEVELAND BRANCH AND WAREHOUSE

Opening of a new Cleveland, Ohio, branch office and warehouse was announced today by Minnesota Mining & Manufacturing Co.

Branch office manager R. L. Rustad said the new facilities are part of a program to extend and improve service to 3M customers in the area. The building, located at 12200 Brookpark Rd., in Cleveland has 70,000 square feet of floor space, about double the space in 3M's previous facilities.

The branch office occupies about 20 per cent of the space in the new single-story structure. Warehousing facilities occupy the remainder of the new building.

DOW NAMES MANAGER IN NEW YORK TERRITORY

James B. Reid, magnesium sales manger in The Dow Chemical Company's Camden, N. J., office, has been promoted to a similar post in the company's New York office territory.

Reid succeds E. H. Killheffer, recently named to head the company's Buffalo sales office. Robert M. Keil, magnesium salesman in Dow's New England territory since 1955, has been named to succeed Reid in Camden.

CLEVELAND MAN ELECTED V.P. OF MERCAST CORP.

Mr. Frank Glaser, Executive Vice President of Cleveland's Alloy Precision Castings Company, has also been appointed Vice President of Mercast Corporation of New York City. This information was released recently by Admiral Alan G. Kirk, Chairman of the Mercast Board of Directors.

Mr. Glaser has been Executive Vice President of Alloy Precision Castings Company, a Mercast subsidiary, for two years. During his tenure of office, Alloy Precision has progressed through several stages of expansion.

The firm now produces lost

wax investment castings as well as frozen mercury investment castings. Thus, Alloy Precision became the only precision foundry offering the complete range of investment casting sizes made possible by the availability of these two processes under a single roof.

Last year, Alloy Precision moved from its old foundry building at 49th and Hamilton Ave. in Cleveland, to new, modern facilities at 3855 West 150th Street. This building was purchased from the Smith Tool Co. for a reported $300,000. Expansion of these facilities, now underway, are being made at a cost of more than $200,000.

OSHRY & CO. TO REPRESENT CHICAGO WHITE METAL

Chicago White Metal Casting, Inc. takes pleasure in announcing the appointment of H. M. Oshry and Company, engineering associates to represent its die casting service in Indiana.

Mr. Syd Gregory who formerly covered this area together with Mr. Bill Keane his new associate, recently transferred to cover Chicago and Northern Illinois area.

W. R. ANYAN DIES AT 60

Walter R. Anyan, Secretary of The New Jersey Zinc Company, died on July 25 at the Greenwich, Connecticut, Hospital. He was 60 years of age.

Mr. Anyan started his employment with the Company in 1915 and progressed through the organization to become Secretary in 1948. He was a graduate of Polytechnic Institute of Brooklyn.

He served on the Board of the First Congregational Church of Old Greenwich, Connecticut. He was a Thirty-Second Degree Mason, a Shriner, and was active in the Y. M. C. A.

D. EATON HEADS SALES OF VACUUM DIE CASTING

Douglas G. Eaton has been appointed Sales Manager of Vacuum Die Casting for Reed-Prentice Corporation, Worcester, Mass., manufacturers of die casting machines. Mr. Eaton will be responsible for promoting sales of Reed-Prentice vacuum die casting equipment on a national basis.

AMERICAN SINTEEL MOVES

American Sinteel Corporation announces that it has completed the removal of its offices and plant to new and larger quarters at: 1019 Saw Mill River Road, Yonkers, N. Y.

Gardsman by WEST

TEMPERATURE CONTROLLERS

serve your need Best

General characteristics: indicating *and* providing positive control; distinctively simple, convenient, reliable, economical; tubeless; plug-in meter units; thermocouple break protected; guaranteed; demonstrated and serviced from offices in many cities here and abroad.

MODEL J SERIES

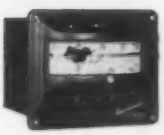
for Off-On control

MODEL JP SERIES

for Proportioning control; more precise where heating-cooling factors are more dynamic

MODEL JL SERIES

combines High Limit and Off-on control



MODEL JE SERIES

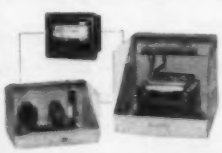
Portable—ideal for laboratories

MODEL JG SERIES

provides Program control, applying any of above control actions to control both time and temperature.

MODEL JS SERIES

gives Stepless control; extremely precise



MODEL JT SERIES

gives 3-Position control for motorized valves, 3-phase heating, heating-cooling cycles

All controllers can be furnished for thermocouples or resistance bulbs. For data on these or other West instruments and accessories, use your classified phone directory or write direct.

the trend is to WEST

WEST Instrument CORPORATION

SALES OFFICES IN PRINCIPAL CITIES

4357D MONTROSE, CHICAGO 41, ILL.

British Plant: WEST INSTRUMENT LTD
52 Regent St., Brighton 1, Sussex
Represented in Canada by Upton, Bradeen & Jones

For more information circle No. 97 on the Reader Service Card

HERE'S HOW...

INVESTMENT CASTING ANSWERS DESIGN PROBLEMS

Investment Casting is a specific production method that fills a specific function. This process offers much greater latitude in shape, detail reproduction and choice of alloy than any other process.

IN SHAPE

The picture tells the story . . . from the cross section it can be seen that the inside dimensions are greater than the holes. How else but by Investment Casting could this be made in one piece?

IN DETAIL REPRODUCTION

One look quickly shows the machining problems — most of them stock removal. By using an Investment Casting 21 out of 45 machining operations were eliminated.

IN MATERIAL

These nozzles for a highway striping paint sprayer, were produced from cold rolled steel until ground glass was introduced into the paint for its reflective properties. To provide necessary wear resistance these parts are now cast in a non-machinable alloy. Performance was not sacrificed because of material limitations.

For more information ask for our brochure . . . its FREE of course.

These are a few examples demonstrating that the function of the part is the first consideration in design — and — the Investment Casting process was the economical answer.

HITCHINER

Manufacturing Company

MILFORD 7, NEW HAMPSHIRE

REPRESENTATIVES IN PRINCIPAL CITIES

For more information circle No. 59 on the Reader Service Card

ALLIED APPOINTS TWO

Charles W. Ostrander has been appointed Technical Director of Allied Research Products, Inc., Baltimore, Maryland manufacturer of the Iridite line of chromate conversion coatings and ARP Plating Chemicals.

In his new capacity, Mr. Ostrander coordinates Research, Development, Technical Service and Manufacturing.

Raymond Stricklen has been named Laboratory Director in the Development Laboratory. In this capacity, he will direct all laboratory development projects as well as quality control operations relating to manufacturing processes and maintenance of industrial standards.

APEX GETS CONTROL OF NATIONAL METALLURGICAL

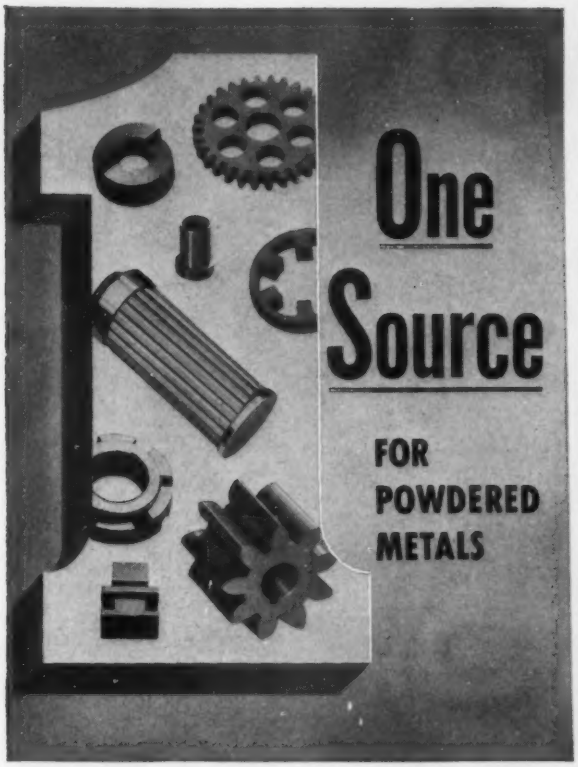
The Apex Smelting Company, with plants in Chicago, Cleveland, and Los Angeles, has acquired full ownership of National Metallurgical Corporation by purchase of the one-half interest held by American Smelting and Refining Company of New York.

National Metallurgical, with a plant at Springfield, Oregon, has been engaged in the experimental production of aluminum silicon alloys and silicon metal, both used as ingredients in production of aluminum alloys. Apex has indicated that an expansion of facilities at Springfield is contemplated in the near future.

FURNACE DEMONSTRATION

R. B. Harrison, International Foundry Supply Co., Spruce & Water Sts., Reading, Pa., announces the September open house — Sept. 9 to 14 — for special demonstrations of Revecon non-crucible furnaces and Reverbale dip-out furnaces. Special heats to be run on these metals: Monel, aluminum, copper, brass, magnesium bronze, phosphor bronze, gray iron and high alloys. Castable metal is accurately weighed against metal as charged; accurate fuel measurements are taken for each heat. These furnaces are specifically designed to cut melting costs 66% —melt metal three times faster. Shell-casters are invited to bring their shells and required metal is melted demonstrating that pouring is continuous.

Continued on page 108



One company can offer you complete metal powders service

Metals Disintegrating Company, the world's largest manufacturer of finely divided metals, has the background and experience to help you in any phase of powder metallurgy. We can supply virtually any metal or alloy in a wide range of particle sizes and in lots of up to 40,000 pounds.

MD Metal Powders are consistently uniform. Parts manufactured from them meet the most exacting specifications.

Metals Disintegrating Company invites you to write for more specific information on your particular application.

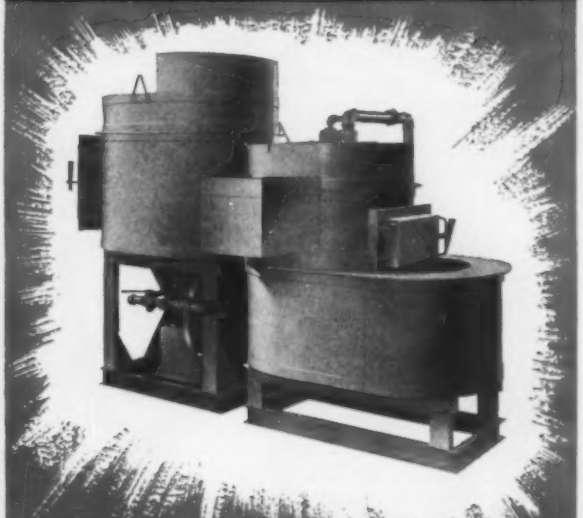
MD PRODUCTS

METALS DISINTEGRATING COMPANY, INC.

GENERAL OFFICES: Dept. 0, Elizabeth 8, N. J.

For more information circle No. 75 on the Reader Service Card

HERE'S ANOTHER NEW ONE!



Stroman "DC" Cylinder Type Furnaces for Combination Melting and Holding Aluminum with CONTAINED COMBUSTION BURNERS

For Die Casting, Permanent Mold and Sand Casting Operations

"Versatility Plus" is the keynote of these newest Stroman Contained Combustion Furnaces. They are absolutely new in design for they incorporate Contained Combustion Burners which eliminate direct flame impingement on the metal. They also make for cooler working conditions because of less heat loss. They give greater fuel economy for less BTU input is required . . . Longest refractory life and least maintenance due to mild combustion conditions . . . Uniform heating condition and improved metal temperature control assure lowest metal losses.

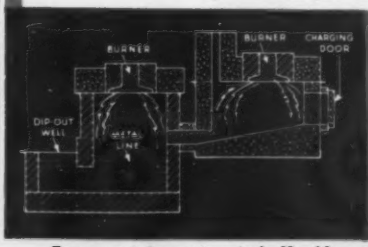
They are easy to charge and readily adaptable to automatic charging. Handling from 450 to 1600 lbs. per hour break down capacity with holding capacity from 600 to 2400 lbs., they will melt metal faster and more economically, and at the same time produce only the highest quality metal.

Roof of the furnaces are easily removed for furnace cleaning, relining, repair or burner service, as burner is mounted in the roof.

These Stroman "DC" Cylinder type furnaces are available in break down and holding combinations. However separate break down and holding units can be purchased. Break down units are often used to augment iron pot, electric and crucible furnace capacities.

Their flawless operation and ability to deliver years of trouble-free operation stamp them as a leading Stroman Aluminum production furnace. Investigate their cost cutting operation today.

Send for complete new catalogue No. 150 just off the press.



STROMAN
FURNACE & ENGINEERING CO.
FRANKLIN PARK
ILLINOIS

For more information circle No. 92 on the Reader Service Card

INDUSTRY NEWS
continued from page 106

RIKER SECT'Y OF N.J. ZINC

Mr. Samuel Riker, Jr. has been elected Secretary of The New Jersey Zinc Company, in place of Walter R. Anyan, deceased. Mr. Riker has been Treasurer of the Company for several years, and he will retain that office, also.

VACUUM TECHNOLOGY SYMPOSIUM

The fourth National Symposium on Vacuum Technology being held in Boston, October 9, 10 and 11, 1957, will present a program of broad interest to research, engineering and production people whose operations employ vacuum techniques and methods.

Approximately twenty-five papers will be presented covering fundamental advances in vacuum technique, means of producing, measuring and conducting low pressures, and advances in applications of vacuum to processing.

Titles of representative papers already scheduled include:

"Some Aspects and Developments of Vacuum Drying and Impregnation", A. Ehlers.

"Furnaces for Vacuum Heat Treating", R. R. Giler.

"Vacuum Systems for Particle Accelerators", R N. Edwards.

"Preparation and Properties of Clean High Area Metal and Alloy Evaporated Films for Use in Surface Studies", S J. Stevens.

"Metallizing Flexible Substrate Materials", P. J. Clough.

"Gas Collection and Analysis Systems Employed in Vacuum Tube Problems", J. Morrison.

"The Steam Jet Ejector: A Versatile Pump for High Vacuum", J. J. Foudrk.

The program has been planned for broad horizontal coverage in the vacuum field. Individuals working in metallurgy, nuclear physics, electronics, coating, drying and impregnation, chemical and physical analysis, and leak testing will find information of interest and assistance. In this fashion the Committee on Vacuum Techniques fills a unique position by offering the worker in vacuum a program and association with others in his field. An additional benefit is the opportunity for cross fertilizing ideas on vacuum technique between widely varying scientific and industrial activities.

The meeting will be held at the Hotel Somerset in Boston.

Federated products:

Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust

Quality in mass production requires quality control from mine to your shop

ASARCO quality control extends from crude ore to the finished zinc die castings made from Federated Di-Metal.

The zinc comes from ASARCO mines. It is refined in ASARCO plants to 99.99+% purity. Di-Metal is produced by the Federated Metals Division under rigid quality control procedures developed by ASARCO's Central Research Laboratory.

Every step of the production process is checked electronically and chemically. Tests are made with every furnace heat; not just at random.

Each Di-Metal ingot meets specifications exactly. It will perform as you expect it to.

Try Federated Die-Casting metals. It will pay you well.

Federated Metals ASARCO

Division of

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway • New York 5, N.Y.

In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

For more information circle No. 49 on the Reader Service Card

JOINS DISTRICT SALES CORP.

David I. Shapiro has joined the staff of District Sales Corp., Los Angeles, exclusive representatives in Southern California and Arizona for Precision Castparts Corporation, Portland, Oregon investment casting firm, according to an announcement by Edward H. Cooley, general manager of the latter company. Shapiro will devote his full time to Precision Castparts activities.

COMPANY REORGANIZES

Precision Metal Products Co., one of the older established investment casting companies has been reorganized and will be known as the Precision Metal Co., Div. of Harvest Farms, Inc.

LOUDEN MADE V.P. BY LEBANON STEEL

Lebanon Steel Foundry has named J. Keith Louden as its vice president, director and chief executive officer. Louden assumes his new position immediately and will become executive vice president of the company October 1, 1957. Edward G. Williams, present executive vice president, will retire in October but will continue as a director.

HIGHER PURITY ALUMINUM

Announcement from the Aluminum Co. of America was recently made that all future aluminum pig will be guaranteed to be no less than 99.5 percent pure.

In the past aluminum pig has been listed as 99 percent minimum. Recent technological advances in aluminum smelting permit the up-grading of the metal to the present 99.5 percent.

SPEAKERS LIST AVAILABLE

The Metal Powder Association has issued a listing of speakers who are qualified to talk on powder metallurgy and related subjects. According to the list, methods, materials, equipment and products can be covered by available speakers.

Individual societies and groups should make arrangements with the desired speaker, though the Metal Powder Association will help when ever possible.

Copies of the list giving all of the necessary information about each individual can be obtained from the Metal Powder Association, 130 West 42nd St., New York or from Precision Metal Molding.

More and More Manufacturers are Installing

MARVEL SYNCLINAL FILTERS

AS STANDARD EQUIPMENT

Manufacturers of hydraulically actuated equipment and others with low pressure liquid circulating systems demand their equipment to perform consistently with all the productive efficiency they build into the machine that bears their name. Since these systems must be kept free of damaging particles, the selection of a filter is an important factor. Here are some of the outstanding reasons for the increasing preference for Marvel Synclinal Filters to do this all-important job!

SUMP TYPE
(cutaway)

BECAUSE . . . Marvels are designed to give maximum ACTIVE filtering area rather than total filtering area. Only ACTIVE FILTERING AREA COUNTS!

BECAUSE . . . Marvels greater storage space for filtered out particles allows longer periods of "production" time at absolute minimum in maintenance cost and "down-time."

BECAUSE . . . Marvels can be disassembled, cleaned and reassembled by any workman in a matter of minutes. Line type operates in any position and may be serviced without disturbing pipe connection.

BECAUSE . . . Marvels are protected and of sound construction to give long life and efficient filtration. THEY MEET J. I. C. STANDARDS.

BECAUSE . . . Marvels (Both Sump and Line Type) are available in individual capacities from 5 to 100 G.P.M. and choice of mesh sizes ranging from coarse 30 to very fine 200, they get a filter to fit their specific requirements.

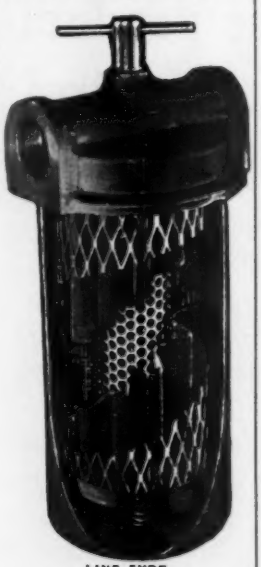
BECAUSE . . . Marvel not only delivers a top grade filter in both quality and performance, but delivers IMMEDIATELY—shipments are made the same day orders are received, if desired.

FACTS—NOT CLAIMS

Engineers decide on the basis of the record, on the basis of measurable facts rather than claims of the "can paint promise" variety. Here is a fact with meaning—

OVER 750 O. E. M.'s

Install MARVEL Synclinal FILTERS as Standard Equipment



LINE TYPE
(cutaway)

For Dependable Protection on All Hydraulic and Low Pressure Systems Investigate

MARVEL SYNCLINAL FILTERS

For Hydraulic Oils
Coolants
Lubricants
Water
and all types of
Fire-Resistant
Hydraulic Fluids

Catalogs containing complete data available on request

MARVEL ENGINEERING COMPANY

7227 N. Hamlin Ave., Chicago 45, Ill. PHONE: JUniper 8-6023

Without obligation, please send me complete data on Marvel Synclinal Filters, as indicated:

- ☐ Catalog No. 100—For Hydraulic Oils, Coolants, Lubricants
- ☐ Catalog No. 200—For Fire-resistant Hydraulic Fluids (Aqueous Base)
- ☐ Catalog No. 400—For Fire-resistant Hydraulic Fluids (Synthetic)
- ☐ Catalog No. 291—For Water

Name .....
Company .....
Address .....
City .....
State .....

PMM-9

DAMEN TOOL CO. MOVES

Damen Tool & Engineering Co., Inc. of Chicago, will move its offices and shops to a recently completed building at 4621 N. Olcott Ave., Harwood Heights, Ill. The new building will allow the company to expand its facilities, provide additional space for new equipment and enlarged office space. The move will allow Damen Tool to give improved service to its customers.

CLEVELAND HARDWARE PURCHASED BY H. K. PORTER

Announcement has been made that the Cleveland Hardware & Forgings Co. has been purchased by the H. K. Porter Co. The purchase is a further step by the Pittsburgh company toward greater diversification. The company name will be changed to the Cleveland Div. of H. K. Porter.

FOUNDRY SUPPLY CO. EXPANDS OPERATIONS

Archer-Daniels-Midland Company, Minneapolis, disclosed today the expansion of its operations in the foundry industry with purchase of Federal Foundry Supply Company, Cleveland.

Warner B. Bishop Jr., Vice President and General Manager of ADM's Foundry Products Division, said the acquisition will provide ADM with a complete line of basic foundry materials and supplies.

The Minneapolis concern now is the country's largest manufacturer of foundry core oils and also produces shell molding, air setting, and CO_2 core binders.

The Cleveland company produces seacoal, core washes, foundry facings, parting compounds, core and mold blowing machines, bentonite, vermiculite, and sells a full line of foundry supplies and equipment, all of which are new to ADM, according to Bishop's announcement.

Acquisition of Federal Foundry Supply's bentonite mines at Colony and Upton, Wyoming, will bring ADM into close association with the fast-growing taconite industry, according to Bishop. Bentonite is used as a bonding agent and in the pelleting of iron ore extracted from taconite rock. Twelve pounds of bentonite are required to bond each ton of taconite pellets.

MAGNESIUM ASSOCIATION MEETING OCTOBER 17-18

"Magnesium In Perspective" has been announced as the theme of the 13th Annual Convention of The Magnesium Association, to be held at The Biltmore, New York City, October 17 and 18.

Papers to be presented will concentrate on a survey and review of the major present areas of use for magnesium plus a projection of new uses and applications indicated in current research and experiment with available and experimental magnesium alloys. Top engineering personnel of missile and aircraft contractors will share the platform with their counterparts from the electronics and equipment industries. Preliminary copies of the program show that Convair, Chance-Vought; Dalmo-Victor; Raytheon; Bell Laboratories; Dow; McDonnell and Turco Products are among the nationally-known companies to be represented on the speaker's platform.

Details of the program and of convention arrangements and facilities are available from Jerry Singleton, executive secretary of the Association, 122 East 42nd Street, New York 17.

DATA IN ADS

continued from page 72

57. Zinc Die Casting—"Die Casting with Zinc Alloys", is the title of a technical guide for plant managers and die casting machine operators, available in quantities from Henning Bros. & Smith, Inc.

58. Mold Steel—A bulletin issued by Heppenstall Co. describes the time and money saving advantages, specifications, and stock availability of their line of mold steels.

59. Investment Casting Design—A technical brochure has been published by Hitchiner Mfg. Co. to aid the engineer in designing for the best and most economical use of investment castings.

61. Die Casting Machines—Bulletin 5400-J from The Hydraulic Press Mfg. Co. gives the complete details on their line of machines that feature better density control, uniform finishes and less scrap.

Continued on next page

is yours when you specify

DIE CASTINGS by MILWAUKEE

Yes, the folks at Milwaukee have learned a lot in these many years of continuous service to industry in the design and production of die cast components for all kinds of products. When you come to Milwaukee for your die castings, their experience is yours at no extra cost. Backed by the facilities of its modern plant, Milwaukee offers you Complete Die Casting Service to help you realize more fully than ever, *all* of the benefits of the die casting process.

Milwaukee operates under the Certified Zinc Plan of the American Die Casting Institute.

MILWAUKEE DIE CASTING COMPANY

4146 N. HOLTON STREET • MILWAUKEE 12, WISCONSIN

Established 1909

For more information circle No. 76 on the Reader Service Card

2 easy ways to make your MOLD STEEL pay!

1. *Send for the Heppenstall Bulletin on MOLDTEM.* It will provide you with information regarding the dependable, uniform quality that will save time and money—when you specify Heppenstall's Mold Steels. It also provides specifications and availability of stocks.

2. *Specify Heppenstall MOLDTEM.* You will save time and money because you will obtain Mold Steels with advantages like these:
   a. Superior machinability
   b. Uniformity of hardness
   c. Exceptional polishing characteristics
   d. Resistance to high pressures
   e. Savings in finishing time

Write or telephone today

HEPPENSTALL

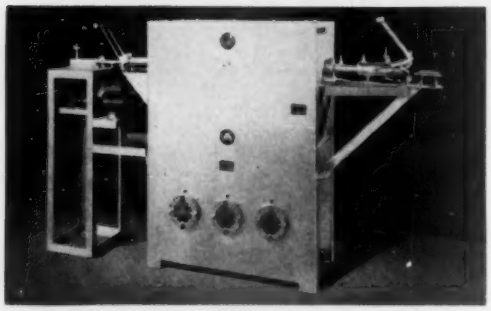
most dependable name in **DIE STEELS**

Pittsburgh 1, Pennsylvania

Sales offices in principal cities

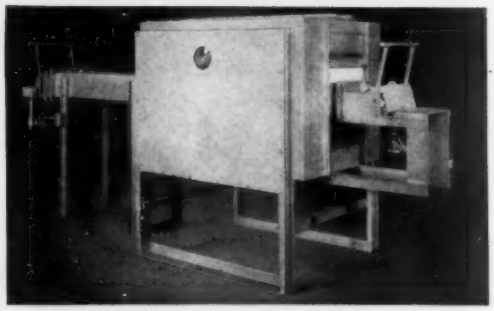
Circle No. 58 on the Reader Service Card

Which Sintering Furnace Do You Need?



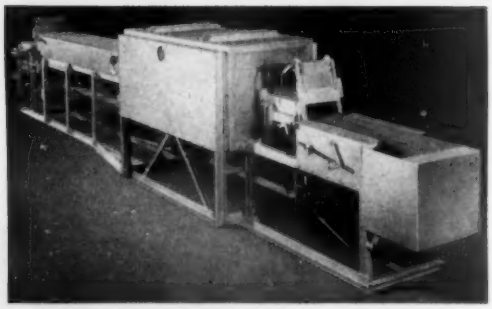
RESEARCH?

Harper Globar Tubular Element Furnaces are perfect for sintering research, with uniform heat up to 3000°F. Fast heat-up, suitable for many atmospheres, low in cost.



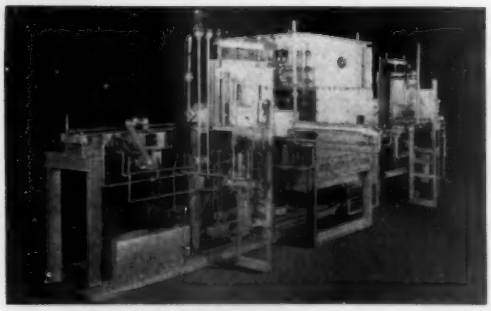
PILOT PRODUCTION?

Inexpensive Controlled-Atmosphere Straight-Through Pusher Furnaces, with entrance tunnel and water-cooled cooling chambers, are the ideal answer for a pilot-scale project on powdered metal parts. Temperatures up to 2100° F. Models available for batch, manual or automatic pusher operation. Wide size range.



QUANTITY PRODUCTION?

Harper Continuous Conveyor Belt and Pusher Sintering Furnaces are designed for large production. Belt Furnaces offer automatic uniform sintering of light weight parts at temperatures up to 2100° F. Pusher Furnaces can take heavy parts and permit operation to 2300° F. Both types have zone temperature control. Standard designs available for stainless steel work.



SPECIALTY SINTERING?

Other types of electric furnaces are also available for high temperature sintering of ferrites, carbides, tungsten contact points, heavy metals, and uranium oxide fuel pellets.

Whatever your sintering problem may be, give Harper engineers an opportunity to work with you.

HARPER ELECTRIC FURNACE CORP.
BUFFALO, NEW YORK

HARPER
ELECTRIC FURNACE CORP.

41 RIVER STREET • BUFFALO 2, N. Y.

For more information circle No. 55 on the Reader Service Card

DATA IN ADS

62. Push-Out Furnaces—that have removable crucibles which save minutes in transfer time on every melt are described in complete detail in Bulletin 70 from Inductotherm Corp.

67. Trim Presses—especially suitable for removing flash from die castings are described in detail in a bulletin from Johnson Machine & Press Corp.

68. Investment Casting Furnaces—Detailed information is available from Detroit Electric Furnace Div., Kuhlman Electric Co. on two direct-casting electric furnaces for investment casting.

69. Die Casting Machines—An illustrated catalog from the Kux Machine Co. gives all of the specifications and operating data on the company's entire line of die casting machines.

72. Die Casting Machine—that can cast up to 6 pounds of zinc or make from 400 to 500 shots per hour is described in Bulletin 101 from Lester-Phoenix, Inc. Detailed information is given on the "one-adjustment" zinc end and central die height adjustment.

73. Die Casting—Informative literature is available on specialized designing for magnesium and aluminum die castings from Litemetal Dicast, Inc.

80. Brass Powder Parts—Detailed information on the design properties, production, and application of brass and other nonferrous powder parts is available from The New Jersey Zinc Co. Included are 20 case histories of brass and nickel silver powder structural parts.

81. Plaster Mold Castings—made from brass, bronze, aluminum and beryllium copper are discussed in an illustrated brochure from Ohio Precision Castings, Inc. The problems and solutions of precision castings are included.

88. Vacuum Die Casting—Complete information is available from Reed-Prentice Corp. on their "Vacucast" system as either original equipment or conversion units.

89. Iron Powders—Booklet Adv-763, from Republic Steel Corp., contains information on test evaluations, chemical composition, and physical properties for their line of powders with the controlled dimensional factor process of manufacturing.

90. Stainless Steel Ladles—and skimmers for non-ferrous metals are listed in data from Spincraft, Inc. Sizes in stock and process are included.

92. Furnaces—Specification charts, cut-away drawings, a complete detailed illustrated listing of products; these are just a few of the features in the new 36-page catalog offered by Stroman Furnace & Engineering Co.

96. Fire-Resistant Hydraulic Fluids—are discussed in the booklet, "Ucon Hydrolubes Spell Safety," from Union Carbide Chemicals Company. The results of laboratory tests and actual service records are presented as well as the ease of conversion to use these fluids."

98. Metals Pilot Plant—where you have the facilities to place your new metal ideas and developments to scale them up under proved production conditions, is presented in booklet B-6570, "For a Competitive Edge" by Westinghouse Electric Corp.

100. Barrel Finishing—A 52-page barrel finishing engineering handbook is available from Almco, Division of Queen Stove Works. Information is also available on the company's complete line of finishers.

102. Hydraulic Trimpress—Detailed information is available on a new trimpress that has 76 cavity openings, 28 platen sizes and a 12" stroke, from Buffalo Metal Container Corp.

103. Abrasive Belt Machinery—is the title of an illustrated brochure from the Bush Manufacturing Co. Complete specification data is furnished on the company's complete line of abrasive equipment.

106. Adjustable Spindle—Bulletin 600B from Ettco Tool & Machine Co., Inc. presents detailed information on the features of their new universal ball joint adjustable spindle multiple drilling and tapping heads.

107. Drilling & Tapping Machine—Literature is available on a new single-operator dual machine for drilling and tapping that has an output of 300 parts per hour from Govro-Nelson Co.

108. Hydraulic Presses—that have the desirable characteristics of hydraulic operation, and yet are fast enough to out-perform mechanical presses are presented in complete detail in literature from Hannifin Corp.

109. Chemical Finishing—Technical data sheets describing the company's complete line are available from Heatbath Corp. Chemical polishing, deburring and protection are discussed.

112. Centrifugal Dryer—that cuts cost, gives smooth moisture-free surfaces and eliminates scarring and marring is presented in an illustrated folder from New Holland Machine Co.

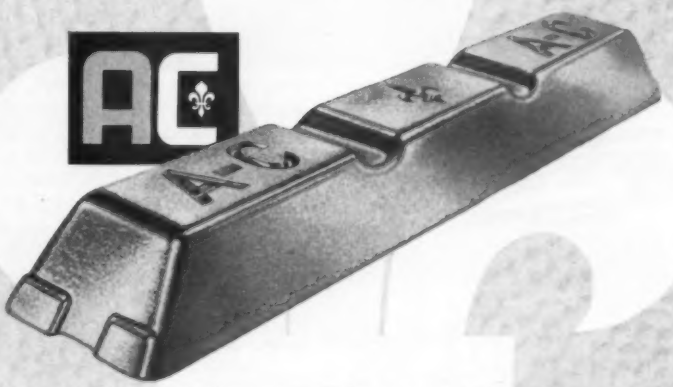
114. Precision Barrel Finishing—is the title of a new booklet issued by Oakite Products, Inc. It contains valuable information on cutting down, deburring, descaling, and burnishing.

115. New Design—Bulletin 1403 from Pangborn Corp. describes the design improvements on the company's line of "Hydro-Finish" equipment.

116. Finishing—A complete technical data folder on the Roto-Finish process is available from the Roto-Finish Co.

117. Paint Adhesion Problems—An informative reference manual from Turco Products, Inc. tells the complete story of phosphating and includes a valuable "Phosphating Reference Chart" which gives the answer to any paint adhesion problem.

...ACcent on quality



The Fleur De Lis, long recognized as a symbol of regal quality, has been adopted by Alloys & Chemicals. This trademark appearing on all our aluminum alloy ingots accents AC ingot quality. The newly designed ingot permits easier handling and stacking.

Now, when you see the new AC trademark you will know your alloy or casting problem can be solved. Learn today why we of Alloys & Chemicals stress the "service behind the ingot."

MANUFACTURERS OF / ALUMINUM CASTING ALLOYS; DEOXIDIZERS IN GRANULATED, SHOT, SHAPES AND NOTCHED BAR FORMS.

ALLOYS & CHEMICALS

MANUFACTURING COMPANY, INCORPORATED

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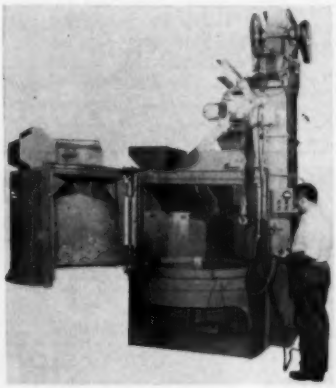
e behind the ingot

For more information circle No. 9 on the Reader Service Card

NEW PRODUCTS AND DEVELOPMENTS

Want complete details on these announcements? Use the Reader Service Cards. You'll find them facing page 72 of this issue

SMALL CLEANING TABLE FOR ALL CLEANING OPERATIONS



A small 4-ft Rotoblast table room for cleaning all types of work in foundries and plants that require a small, flexible machine, has been introduced by Pangborn Corporation. Designed for a wide range of cleaning operations, the machine will take castings, forgings and stampings up to 48"diameter x 24" high, as well as plastic and composition materials.

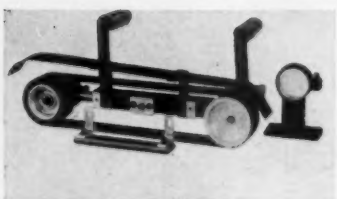
Capable of handling loads weighing up to 4000 lb., this new table is equipped with a cast labyrinth abrasive sealing system which makes the cabinet abrasive tight without rubber gaskets. The single door opens to expose half of the 48" diameter rotating work table, for efficient loading.

The single overhead wheel, powered by a 10 hp motor, will throw 15,000 lb. of abrasive per hour and for extra cleaning capacity, an optional 15 hp motor is available that will throw 22,000 lb. of abrasive per hour.

A self-contained automatic elevator and separator continuously clean used abrasive and recirculate it to the wheel.

Circle No. 205 on Reader Service Card

PORTABLE ABRASIVE BELT GRINDER FEATURES HIGH SURFACE SPEED



The Model 2142 abrasive belt grinder offers fast operation with reduced operator fatigue. The unit, manufactured by Abrasive Machinery, is designed for portable or fixed bench mounting. It will handle any grade of grit, aluminum oxide or silicone carbide abrasive in 2" wide belts.

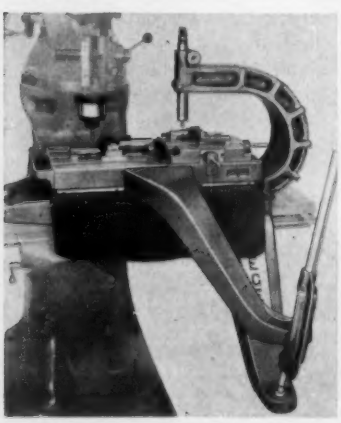
Grinding of convex or flat surfaces is permitted by the flexibility of the belt. Over or under the work grinding is permitted by reversible handles. Six different handle adjustments can be made by the operator.

Made of a cast aluminum alloy frame, the grinder is powered with a 1-½ horsepower air motor which gives the belt a surface speed of 6000 feet per minute. Complete, the unit weighs 9 pounds 4 ounces.

Heat dissipation is rapid due to the structural nature of the belt. Replacement of the belt is made easy by applying pressure against the spring-loaded idler wheel assembly.

Circle No. 206 on Reader Service Card

DUPLICATOR PERMITS 2 DIMENSIONAL CONTOUR PROFILING



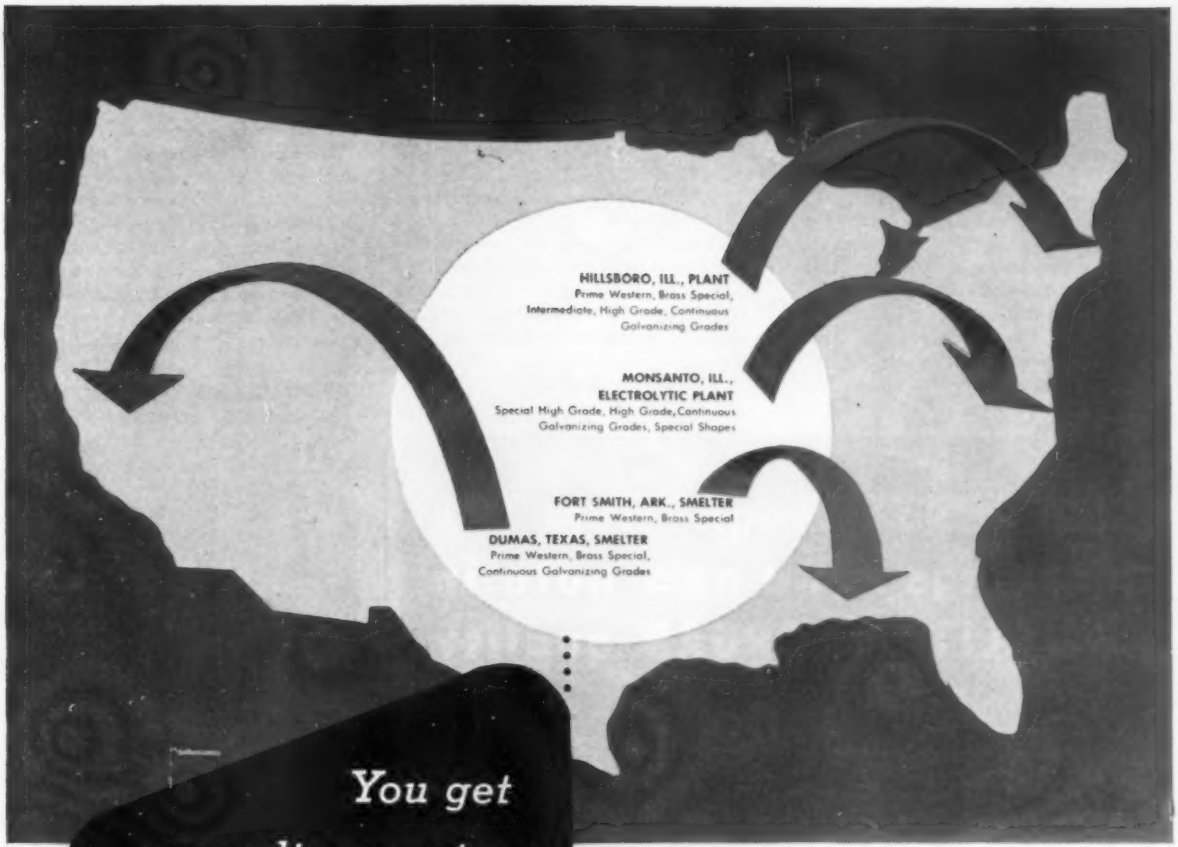
The new model R-200 Duplicator, manufactured by J. M. Kalins Co., permits fast, easy and exact 2 dimensional contour profiling on any vertical miller in use today. This replaces previous duplicators which were designed for use on Bridgeport machines only.

By tightening only 4 bolts the unit will mount on any table. It is a self-contained unit—combining the extra sensitivity of true fluid motion with a new and unique rigidity provided by a base-casting-mounted follower arm. The machine is completely controlled by a single lever.

The unit is equipped with a rugged adjustable built-in friction brake—sturdy enough for top-capacity profiling jobs. The free-moving table is float-mounted on ball-bearings in circular ball-bearing raceways. Capacity is 6" x 6"—with a 1 to 1 ratio with the master.

Circle No. 207 on Reader Service Card

Continued on page 116


HILLSBORO, ILL., PLANT
Prime Western, Brass Special, Intermediate, High Grade, Continuous Galvanizing Grades
MONSANTO, ILL., ELECTROLYTIC PLANT
Special High Grade, High Grade, Continuous Galvanizing Grades, Special Shapes
FORT SMITH, ARK., SMELTER
Prime Western, Brass Special
DUMAS, TEXAS, SMELTER
Prime Western, Brass Special, Continuous Galvanizing Grades

You get speedier service from the **ZINC ZONE**

Central location of American Zinc plants assures prompt deliveries of slab zinc to any point in the nation.

PRODUCERS OF

ALL GRADES OF SLAB ZINC
ZINC ANODES (Plating & Galvanic)
METALLIC CADMIUM
SULPHURIC ACID
LEAD-FREE and LEADED ZINC OXIDES
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CRUSHED STONE

American Zinc sales Company

Distributors for AMERICAN ZINC, LEAD & SMELTING COMPANY

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For more information circle No. 14 on the Reader Service Card

ALL-WELDED, HEX CYLINDERS . . . for barrel plating machines

The first all-welded cylinders of hard rubber or "H-T Sincolite", to fit automatic oblique barrel plating machines, have been introduced by G. S. Equipment Co. Featured are rugged, heavy-ribbed hex design cylinders for better tumbling action. This is a marked advance over the more costly, conventional "round" cylinder. A special hole perforation design, providing more "open" area, allows rapid drainage.

The Tempron Cylinder will operate in solution temperatures up to 250 F., air-dry temperatures up to 350 F.

Circle No. 216 on Reader Service Card

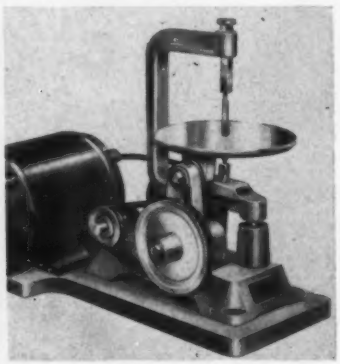
PLATE STRIPPER . . . without use of electrical current

A flaky, light organic compound for chemical stripping operations, has been announced by Wagner Bros., Inc. When combined with sodium cyanide and dissolved in water, the new development will strip plated deposits from ferrous-base metals without the use of electrical current. It removes copper, nickel, cadmium and zinc as well as silver. Part size will not affect the results.

Iso-Strip has the following advantages: It does not etch the base metal; eliminates racking procedures; no supervision is required, stripping can be done at night; and the chemical can be used in a cold state by increasing the immersion time.

Circle No. 211 on Reader Service Card

DIE FILING MACHINE . . . is motor-driven



A new, small size bench-type die filer for filing and sawing small dies, jigs and templets, has been announced by High Speed Hammer Co.

Featuring a tilting table, the new unit uses standard 3½" or 4" parallel machine files as small as 3/64" in diameter. Rigid mounting design in the yoke holding the files assures positive accuracy in operation.

Circle No. 212 on Reader Service Card

CERAMIC FIBER . . . will withstand temperatures in excess of 2000 F

The Research & Development Division of The Carborundum Co. announces a new ceramic fiber. Fiberfrax, an aluminum silicate material, will withstand temperatures in excess of 2000 F. Uses of the cloth and tape include insulating gaskets, filter media, conveyor belts, various kinds of heat and flame barriers and membranes, and other high temperature applications where a flexible sheet material is required. The fabrics cover a wide range of weights from 15 to 74 ozs. sq. yd. and are made from staple fiber yarns in a variety of weaves and constructions.

Circle No. 213 on Reader Service Card

ACCURATE Magnesium Die Castings . . . a new note in WURLITZER ORGAN quality

Large two piece magnesium die cast reed holder produced for the Wurlitzer Co.

The change from a heavier metal casting to ACCURATE magnesium die castings reduced weight and production costs for the Wurlitzer Co. Priced competitively with heavier metal castings, these matched magnesium die castings were lighter to handle, machine, and assemble . . . are shock-resistant . . . non-rusting and dimensionally stable. ACCURATE die casting engineers would welcome the opportunity to work with you in adapting magnesium die casting to your product. Write today for recommendations and cost estimates.

Here are a few additional advantages combined in each ACCURATE Magnesium Die Casting:

- Light Weight
- High Strength
- Low Cost
- Fine Surfaces
- Close Tolerance
- Uniformity
- Laboratory Controlled Quality

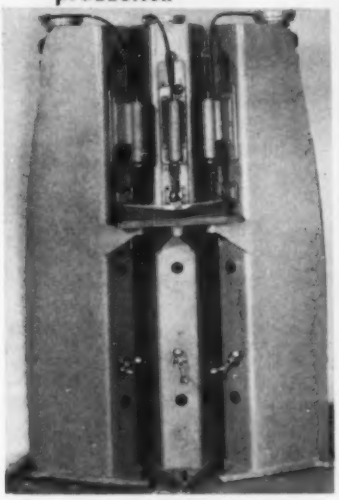
Major Producer of Aluminum, Zinc and Magnesium Die Castings

ACCURATE DIE CASTING CO.

3089 E. 80th STREET • CLEVELAND 4, OHIO

For more information circle No. 4 on the Reader Service Card

STUD DRIVING MACHINES . . . emphasize high production



It is no longer necessary to have a special stud driving machine for each different job. Studrive, Inc. has developed a unit which drives a single stud. Design of these units allows several to be placed together in an infinite variety of patterns, to perform stud driving operations as close as 2" centers for a specific part. When production is finished, the machines may be re-arranged to perform another operation. Operating off a central pneumatic power system, the units also feature the lead screw system for feeding the stud into the casting.

Circle No. 208 on Reader Service Card

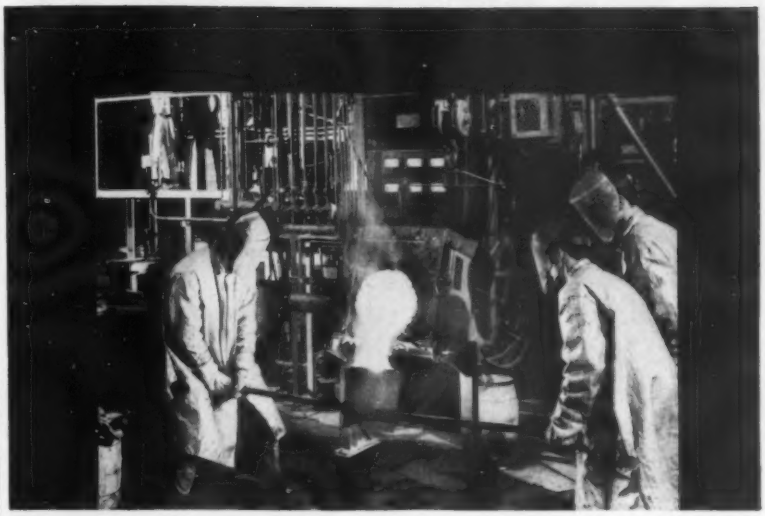
CLEANING GENERATOR . . . is bench size

Branson Ultrasonic Corp. has introduced a new size generator for use with Branson tank-type or all-welded stainless steel immersible transducers. The generator is ideal for unattended and quick cleaning of small parts.

Rated r-f output of the 10 x 16 x 12 in. deep generator is 125 watt average power, with peak power on pulses of 500 watt.

Circle No. 209 on Reader Service Card

(Continued on Page 123)



At your command . . .

PILOT PLANT FOR METALS

How do you explore full production conditions and produce prototype quantities of castings and new alloys?

Use the Westinghouse Metals Plant. This combination development and pilot plant facility provides the place where your new metal ideas and developments can be scaled up under proved production conditions. Here you can compare various types of metallurgical processes and products.

Some production capacity can also be made available at Blairsville for fast, dependable delivery of metal products.

Arrange to see the 16-mm, full-color, 22-minute Westinghouse film, *This New World of Metals*. Also get descriptive booklet B-6570, *For a Competitive Edge*. Write Westinghouse Electric Corporation, Materials Manufacturing Dept., Blairsville, Pa.

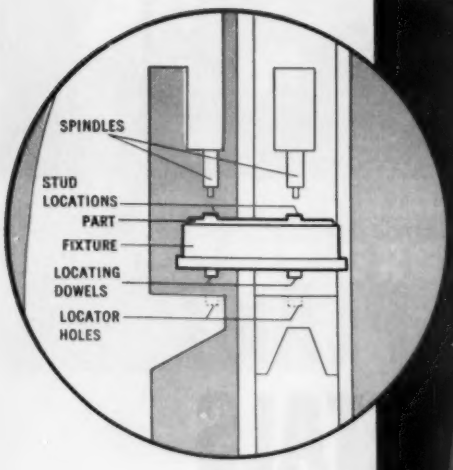
J-05004

YOU CAN BE SURE...IF IT'S

Westinghouse

For more information circle No. 98 on the Reader Service Card

REVOLUTIONARY



Locating dowels in fixture base, directly under each boss, match pedestal holes to provide perfect spindle line-up.

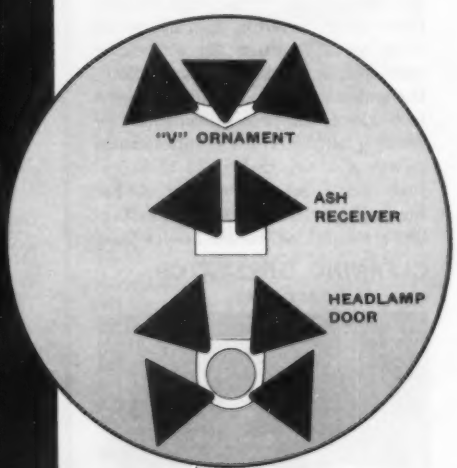
STUDRIVE units are high speed, flexible, precision tools (cycle time 1.5 seconds) with lead screw feed. Even low production jobs can be effectively automated with one or more **STUDRIVE** units.

STUDRIVE units have no complicated electrical panels . . . no motors. They are air cylinder operated requiring only .3 cu. ft. per stroke air consumption. Simple 110 volt circuit used for vibratory hopper.

Studrive Unit Series 100

"PEDESTAL" STUDRIVE UNIT

can be used individually or in groups . . . for single or multiple stud driving requirements

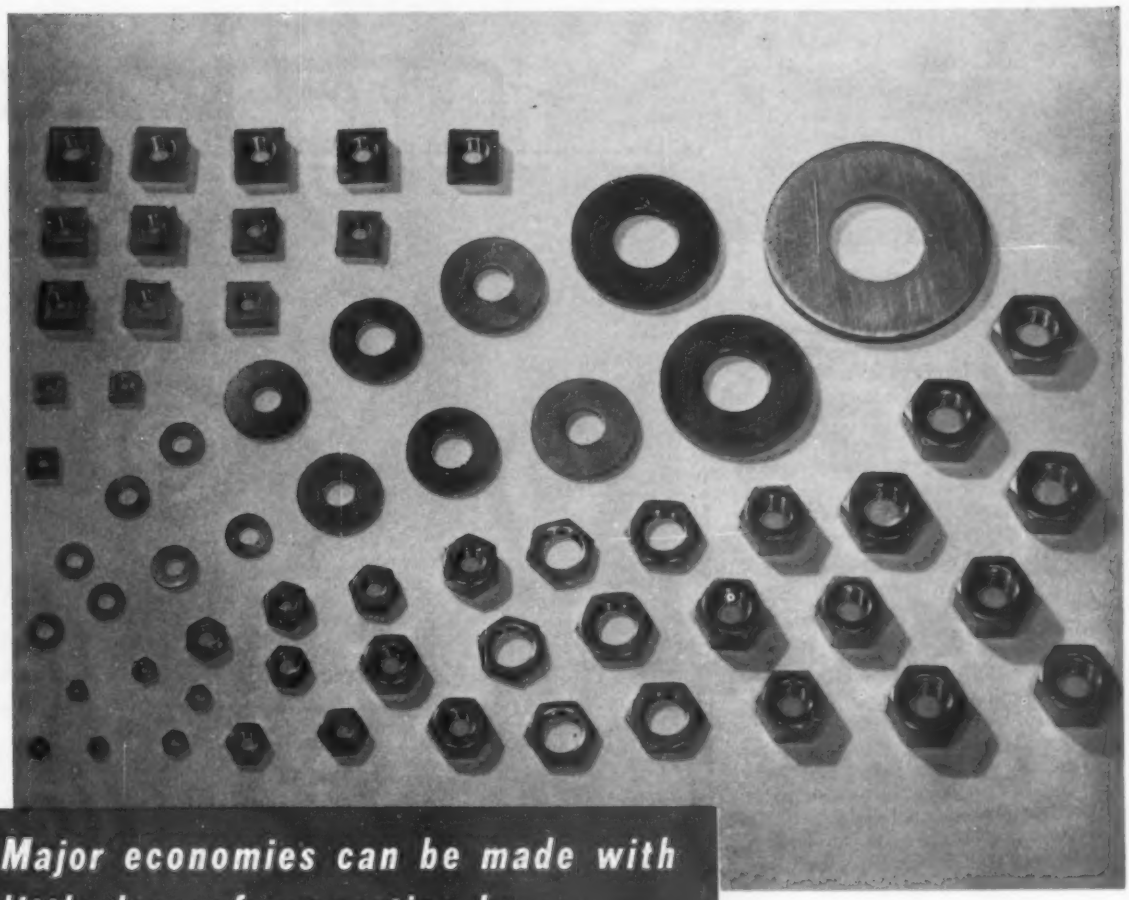


Unique triangular construction allows easy grouping in unlimited positions. Simple installation means minimum change-over-time from one job to another.

for additional information write . . .

tudrive, inc.
2704 East Larned
Detroit 7, Michigan

For more information circle No. 208 on the Reader Service Card



Major economies can be made with little loss of properties by . . . . . .

Making Nuts And Washers From Powder

By Philip V. Tarr*

ADVANTAGES:

Volume production of small parts at low cost is one of the major advantages which is constantly opening new fields of application for powder metallurgy processing techniques. One notable example of this is the production of standard nuts and washers from sintered brass. Nuts and washers are distributed on an extremely competitive price and quality basis, yet through use of the metal powder process, the Midwest Sintered Products Corporation of Chicago produces first quality sintered brass nuts and washers under very favorable cost conditions.

The use of this process represents a complete break from more conventional fabricating methods. Traditionally, machine screw nuts have been made as punched from sheet stock, machined from bar stock, or cold forged from round wire. At Midwest, all of the advantages of powder metallurgy are realized as follows: (1) Simplified raw material stores resulting from elimination of multiple bar and sheet stocks; (2) Minimum scrap loss as measured in terms of the material cut from the blank in tapping; (3) Lower cost raw material; and (4) Simple tooling for high speed machinery resulting in costs equal to or less than production costs experienced through the use of other fabricating methods.

Although only one metal powder fabricator is producing a standard line of sintered brass nuts and washers, this does not represent a radical departure from the usual sintered metal operation. Basically, the production facility was planned to handle a large volume of small brass parts at low cost. However, each production operation was planned in such a manner that a so-called "Manufacturing Unit" was developed to function with efficient man-hour distribution and with the resulting low operating costs.

*Gen. Mgr.
Midwest Sintered Products Corporation

OFERATIONS:

The operations performed are:

1) Powder Blending
2) Molding
3) Sintering
4) Impregnating and Finishing
5) Tapping

Careful planning resulted in a plant and equipment layout yielding a balanced output with these operating efficiencies:

Molding — 95%
Sintering — 98%
Tapping — 80%

The size of each operational section of this "Manufacturing Unit" was established on the basis that profitable operation must equal or exceed five-thousand average finished nuts per factory man-hour.

TOOLING SYSTEM:

Some special procedures were developed to counteract cost factors usually considered significant by the powdered metal industry. A standard tooling system was developed with the following significant features:

1) Average press set up time of 15 minutes
2) Average die cost of $6.00
3) Average punch cost of $.97
4) Average core rod cost of $.89
5) Average overall tool life of as many as one and one-half million nut blanks.

In addition, a system of standard production processing controls was developed so that all nuts would be molded to the same density and sintered on the same weight-temperature-time basis. This system has resulted in the automatic and routine processing of new nut orders from the order desk to the shipping floor.

Operating in accordance with these principals, a "Manufacturing Unit" consists of four men and produces average nuts at the rate of six-thousand finished nuts per operating man-hour. The basic raw material is a brass powder containing 77-80 per cent copper, 1-2 percent lead, maximum impurities of .7 per cent, and the remainder zinc. When blended with a lubricant to insure efficient operation of the molding tools, this powder is formed into nut blanks on automatic presses which can produce from 20 to 150 nuts per minute. The blanks are subsequently sintered to the desired strength and ductility at furnace temperatures varying from 1600° F to 1700°F in a protective atmosphere such as dissociated ammonia. They are then cut-threaded to customer specifications. At this stage, the nuts have a smooth bright brass finish. However, if required, they can also be plated with cadmium, zinc, nickel or tin. The finished article is clean in detail and can be produced to extremely close tolerances.

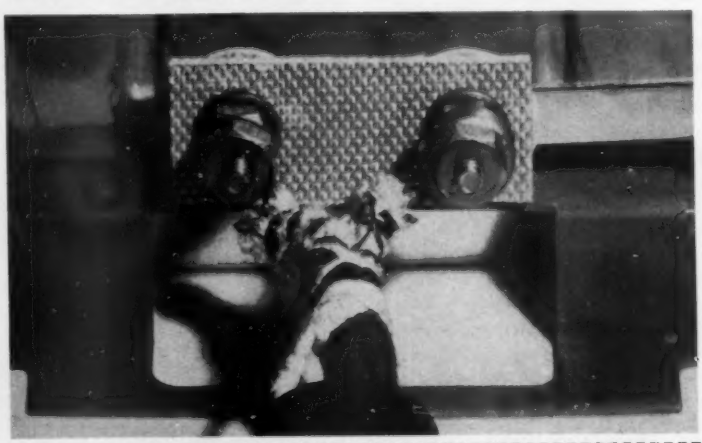
Continued on page 123

TORQUE TEST proves brass powder nuts averaged ultimate torque of 60 inch-pounds when applied to hardened steel screw.

TABLE 1

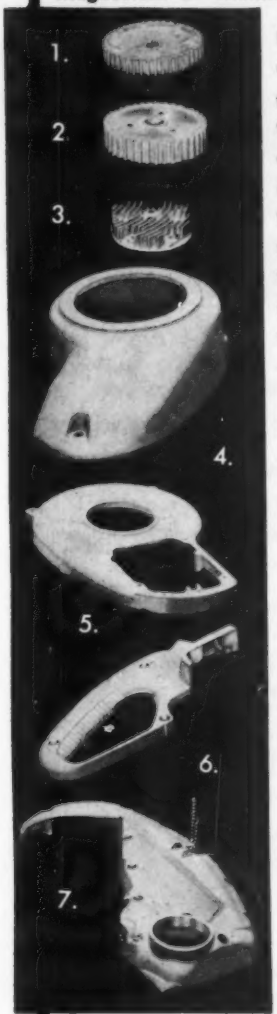
NUT MATERIAL	BRASS SCREW (IN #)	STEEL SCREW (IN #)	HARDENED STEEL SCREW (IN #)
Steel	45 43 43	50 48 52	65 68 70
Brass Nut (Milled from bar)	36 37 37	52 48 48	63 68 51
Sintered Brass Nut	32 33 35	37 38 35	45 42 40

TERMINAL BOARD NUTS as they are used on a nationally advertised electric toaster. Attached wires lead off bottom.



LIGHTNESS of WEIGHT is ESSENTIAL for PORTABLE TOOLS

Many Manufacturers Have Solved Their Needs for Making Tools REALLY Portable by Using Magnesium or Aluminum Die Castings.



Not only do magnesium and aluminum die castings greatly reduce weight but their toughness and mechanical strength are adequate for the vigorous use to which they are put in such products as portable tools. Furthermore, the great reductions in weight that these lightweight alloys effect reduce working fatigue — thus increasing productivity in the use of these tools.

The photograph illustrates Chain Saw parts die cast from aluminum and magnesium. They are all typical applications and include: 1. and 2. Drive Pulleys, 3. Cylinder Head, 4. and 5. Blower Housing, 6. Handle, 7. Gas Tank Cover. Components such as these have, when die cast, offered greater scope to the designer, and to the manufacturer, important savings through the virtual elimination of machining, finishing and assembling.

Let's Talk It Over . . .

LITEMETAL DICAST, INC. is an organization of specialists — men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs — little machines for little jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

ID *Write today for literature and design . . . Quick action on inquiries.*

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A SUBSIDIARY OF HAYES INDUSTRIES

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PLANT AND EXECUTIVE OFFICES

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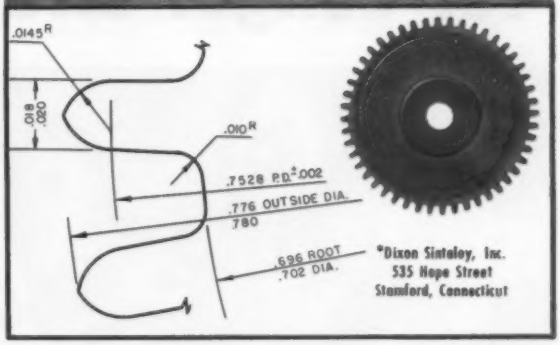
BRASS GEARS PRESSED FROM POWDER

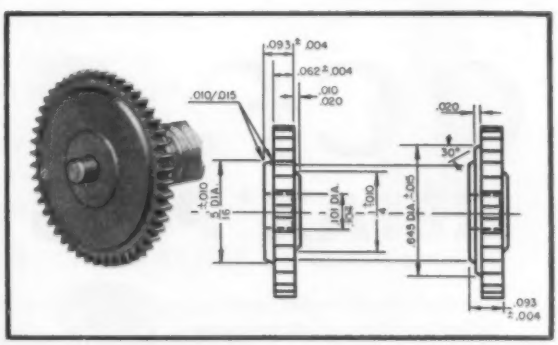


*Dixon Sintaloy, Inc.
535 Hope Street
Stamford, Connecticut

. . . not only save money in manufacturing costs at the Marvel-Schebler Products Division of the Borg-Warner Corporation, but they are made dimensionally accurate to very close tolerances by its supplier* of brass powder parts.

Alternative methods of production involve scrap loss, machining time and expensive bar stock. On the other hand, as pressed and sintered from 80–20 leaded brass, the gear requires no secondary operations, involves no scrap loss, is accurate and durable.

The linear sequential timer in which this brass powder gear is used controls the operations of a leading home appliance in which dependability, long life and low cost are of major importance.



What can BRASS POWDER PARTS do for you?

For detailed information on the design, properties, production and application of brass and other nonferrous powder parts you should have a copy of our manual. It will give you 20 case histories of brass and nickel silver powder structural parts to assist in evaluating this means of production in terms of your particular needs.

SEND FOR YOUR COPY

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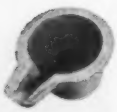
Close-Grained for Longer Life

acf REFAX® POTS



Careful metallurgical control makes low alloy nickel-chromium cast iron *Refax® Pots* extra tough and durable. Close grain adds strength without brittleness. Tapered design allows quick heat absorption without swelling or distortion. Send for detailed bulletin covering superior quality **acf** Refax Pots, Refax Utility Castings, Goosenecks and Ingot Molds. Write Dept. 9-I, American Car and Foundry Division, **acf** Industries, Incorporated, 30 Church St., New York 8, N. Y.

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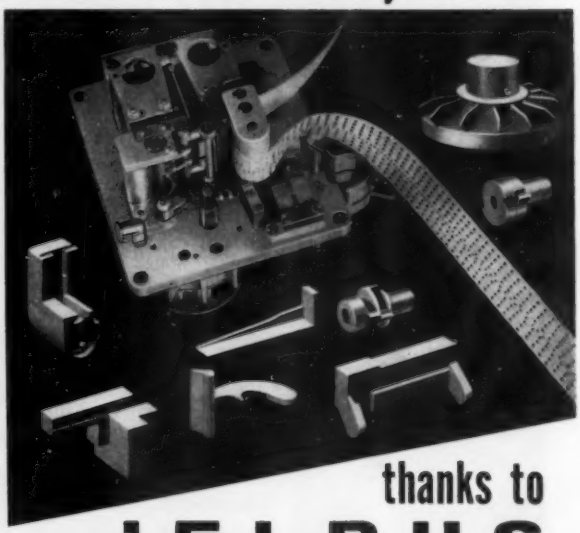
machines that count *Faster*



thanks to JELRUS INVESTMENT CASTINGS

2,000 punched holes per second: That's the fantastic speed achieved in a tape punching machine designed and built by Soroban Engineering Co., of Melbourne, Fla.

17 components—JELRUS Investment Castings—were required to help this machine feed data to Analog Computers at the rate of 200 ten-digit numbers per second on a punched tape.

The inherent economies and design flexibility of Investment Castings were fully exploited in this assembly:

- Low Tool Costs—making even short runs, such as this application, economical.
- Close tolerances and smooth surfaces reducing machining time.
- One casting for parts previously assembled.
- Wide selection of high-strength, corrosion- and wear-resistant alloys.

JELRUS INVESTMENT CASTINGS have the inherent advantages to solve your small-parts problems. Send us your blueprints. Our engineering and sales divisions are at your service.

COMPLIMENTARY to responsible manufacturers
A free copy of the trade standards compiled by the Investment Casting Institute—"INVESTMENT CASTING ENGINEERING AND DESIGN MANUAL"—will be personally delivered to you and explained in detail by a JELRUS representative—at your request.

JELRUS PRECISION CASTING CORP.
615 WEST 131st STREET
NEW YORK 27, N. Y.

For more information circle No. 65 on the Reader Service Card

NUTS AND WASHERS

continued from page 120

TESTS:

Being similar in properties to cast brass products, sintered brass nuts are generally weaker than those made by other methods from one-half hard or full hard brass mill goods. Tests have shown that the material from which these nuts are made maintains an ultimate tensile strength of approximately 32,500 psi. When applied to a hardened steel screw, a sintered brass hex nut (#10-32 x 3/8 x 1/8), has a minimum ultimate torque strength of 40-inch-pounds as noted in Table 1.

Despite the lower unit strength of sintered brass, nuts can be designed to be made from this material and still perform satisfactorily in highly-loaded applications.

COSTS:

Although only sintered brass nuts and washers are stocked, these items can be made from nickel-silver (18-Ni, 18-Zn, 64-Cu) and from pure copper. In general, the net prices for sintered brass nuts range from 5 per cent to 15 per cent lower than the prices published for nuts made by more conventional methods and the net prices for sintered brass flat washers range from 10 per cent to 20 per cent lower than the prices published for similar size washers blanked from sheet brass.

NEW PRODUCTS—

continued from page 117

SPECIAL ROUGHS
. . . does two finishing operations

The specially constructed Deka-Bore boring head is designed for a specific boring operation. Rigidly constructed, the roughing tool in the front of the quill, will remove stock from a cast hole. The finishing tool will follow behind and finish the hole, holding a tolerance of .0003".

The product, manufactured by Precision Tool Mfg. Co., Inc., has a dial which permits simple, rapid, accurate adjustments to .0001" on diameter without backlash. With a radial movement the bore is especially well adapted to boring in close quarters.

Circle No. 214 on Reader Service Card

TUBE GRINDER
. . . for internal welds, seams, etc.

The Model T-G Tube Grinder was developed for grinding internal seams, welds, etc. on tubular products. Manufactured by Bush Mfg. Co., the grinder efficiently and quickly removes and deburrs objectionable particles in preparation for paint, plating, glass lining, or for general appearances. Abrasive belt capacity: 1" to 2" width — 132" to 168" length. The grinder is controlled by an automatic air control of abrasive belt tension and work pressure application.

Circle No. 217 on Reader Service Card

HIGH-SPEED END MILLS
. . . for machining aluminum and aluminum alloys

New design features have been announced for Putnam high-speed end mills. High helix, a thin web, and high polish finish are highlights of the new design. Easy chip disposal is obtained with the combining of the high helix and thin web. This pulls the chips away from the work and throws them where they will not hinder the cutting action. Garrett Supply, a division of the Garrett

NOW ESPECIALLY DESIGNED FOR ADDED SAVINGS TO DIE CASTERS!

D-M-E STANDARD Water-Cooled SPRUE BUSHING

- *Nitrided for Longer Wear*
- *Large Capacity Cooling Jacket*
- *Ground, Nitrided and Polished Seat*
- *Available From Stock*
- *Priced at $25.00 Each*

D-M-E STANDARD Water-Cooled SPRUE SPREADERS

- *Nitrided for Longer Wear*
- *Straight or Tapered Body*
- *Uniform Center Cooling for Fast Cycles*
- *High Quality Air-Hardening Steel*
- *Available From Stock*
- *Priced at $16.00 Each*

D-M-E STANDARD TAPERED CUTTER for Sprue Spreaders

- *Solid Carbide Cutting Edges — Rigid One-Piece Design*
- *Specially Designed for Standard Sprue Spreaders*
- *Available From Stock*

- *Priced at $28.00 Each*

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CLEVELAND 9, O.-D-M-E CORP. 502 BROOKPARK RD., SHADYSIDE 1-9202
LOS ANGELES 7, CAL. 3700 SOUTH MAIN STREET, ADAMS 3-8214

For more information circle No. 39 on the Reader Service Card

Corporation announces that this fast cutting combined with higher feeds and speeds actually requires less power, promotes longer tool life and provides better finishes. There are 185 sizes and types available.

Circle No. 220 on Reader Service Card

SALTS RESTORE PLATING BATHS
. . . to full trouble-free production

Sel-Rex Corporation announces that Pur-A-Salts will restore contaminated cyanide electroplating baths to full trouble-free production. This development consists of a formulation of barium double metal cyanides, or barium in combination with other cyanide electrolytes.

The salts will remove carbonates, sulphates, and chromates through preferential precipitation depending on the solubility of these impurities. The precipitation is effected on a molar basis — three ounces of silver salts will remove one ounce sulphate or carbonates, and will supply about 1.35 ounces on metallic silver. Thus, not only is the free cyanide content of the bath undisturbed, but impurities are removed while other bath constituents are maintained at the desired ratios.

Circle No. 215 on Reader Service Card

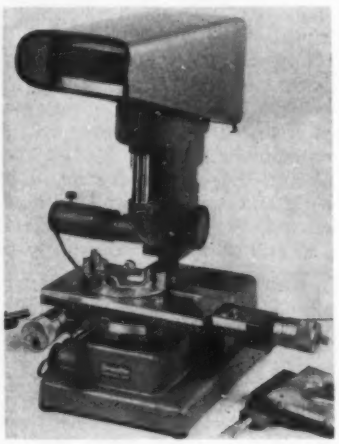
HYDRAULIC CYLINDERS
. . . new series available

Hydro-Line Manufacturing Co. announces a new line of hydraulic cylinders, designated Series "N". Rated for operation at 2000 psi and higher, the cylinders meet JIC specifications.

Thirteen standard mountings are available to meet varied installation requirements. Assembly is simplified because the cylinders are available with a large external thread, a smaller external thread with shoulder, or an internal thread.

Circle No. 219 on Reader Service Card

INSPECTION PROJECTOR
. . . has wide range of uses



Featuring extreme versatility and extended capacity, the Toolmaker's Projector, manufactured by Stocker & Yale, Inc., is ruggedly built for accuracy and stability under shop conditions.

Uses of the projector include inspection of circular form and single point tools; drill, tap, reamer inspection; screw machine parts, etc. Small tools, parts, etc. may be examined by sub-stage and surface illumination, showing both contour and surface details.

Circle No. 210 on Reader Service Card

NEW MOUNTED WHEELS
. . . in standard shapes and sizes

The Carborundum Co. has developed a new improved mounted wheel. The exceptional strength and free-cutting qualities of V40 bond permit extra-fast stock removal with a minimum of pressure. The new line is said to be able to hold size and shape exceptionally well, even on the hardest and toughest of metals.

The wheels can be supplied with hard, nickel-plated mandrels in a variety of sizes to fit various chucks and to meet the demands of the many operations found in the industry.

Circle No. 221 on Reader Service Card

3 NEW PRESSES by JOHNSON ideally suited for DIE CAST TRIMMING

★ Extra Wide Beds
★ Extra Deep Throats
★ Extra Large Ram Faces
★ Extra Shut Heights
★ Extra Large Openings Through Backs
★ Pin Clutch or Air Clutch
★ Flywheel or Back Geared

FOR DETAILED SPECIFICATIONS PHONE, WIRE OR WRITE FOR BULLETIN

Presses of unmatched versatility for draw, punch, trim, cut and assembly operations. 23 Models — 16 to 150 ton cap. OBI Presses. Also Double Crank Gap and Straight Side Presses up to 250 ton cap.

Johnson MACHINE and PRESS CORP.
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MASKING DEVICE
. . . permits spray decoration of round objects

A method developed by Conforming Matrix Corporation makes the spray decoration of round objects easy and economical. Made of a special electroformed nickel which combines the desired qualities of strength and ductility with rigidity, mask shape is retained over an extended life. The stencil type mask is applicable for multiple color design on smooth, round cylindrical or semi-spherical shapes.

Circle No. 222 on Reader Service Card

ROUTER BITS
. . . of wear- and abrasion-resistant steel

Called "M-11", the bits are designed for tooling aluminum and other light metals. Developed by the Detroit Tap and Tool Co., the bits provide longer life at high operating speeds and are made of a specially-alloyed and heat-treated chrome-cobalt high speed steel.

Straight fluted bits range from 1/16" to 2" diameter; spiral fluted bits from ⅛" to ¾" diameter. All have straight shanks.

Circle No. 223 on Reader Service Card

AIR-LINE FILTERS AND LUBRICATORS
. . . for pneumatic equipment

Manufactured by the Bellows Co., these unique units filter and lubricate compressed air to insure maximum efficiency and life of pneumatic equipment. Twin baffle plates create centrifugal circulation of incoming air, forcing water and dirt particles to the base of the plastic reservoir. Any smaller dirt particles are trapped by a Bendix Skinner 40 Micron filter, leaving pure outgoing air.

Circle No. 224 on Reader Service Card

MULTI-BARREL FINISHER
. . . features adjustable speeds

Model V-16 is a heavy-duty unit suitable for many tumbling, burnishing and deburring operations. The unit features a variable-speed direct gear drive. Speed adjustments are possible from 8 to 25 rpm. Fast production finishing can be performed with full control and safety with the built-in magnetic brake and perforated metal safety guard. The finisher, manufactured by Rampe Manufacturing Co., also features a large 16 cu. ft. capacity choice of one to four compartment barrels, no-seam vinyl barrel linings, 3 h. p. motor, forward and reverse jogging switches and all-welded ¼" steel plate construction.

Circle No. 225 on Reader Service Card

PORTABLE LIQUID FILTER
. . . doubles as pump

Sel-Rex Corporation announced a portable liquid clarification filter equipped with a special by-pass valve allowing the pump to be used for solution transfer. The Sel-Rex Filter BS-3 measures 36" in height, requires only 1½ square feet of floor space, and has a capacity of 800 gallons per hour.

Circle No. 226 on Reader Service Card

SELF FEEDING AIR DRILL
. . . drills small holes automatically

A new tool, the "Midg-A-Matic", can drill holes automatically with a capacity to 1/16" holes and under. Manufactured by the Aro Equipment Corporation, the drill measures only 1" in diameter and 10-3/16" long. With a speed of 20,-

Continued on next page

reasons why you can rely on

die castings from Pressure

- ENGINEERING "KNOW HOW"
- SKILLED TOOL AND DIE MAKING
- MODERN DIE CASTING EQUIPMENT
- RIGID POINT-BY-POINT INSPECTION
- CERTIFIED ZINC AND ALUMINUM ALLOYS

The result is die castings of utmost quality and precision . . . delivered "on time" and in exact accordance with your specifications. Next time make sure you order "die castings from Pressure."

PRESSURE CASTINGS, INC.

ZINC AND ALUMINUM DIE CASTINGS

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000 r.p.m., the drill can be used singly or in multiples with a very low air consumption.

Circle No. 227 on Reader Service Card

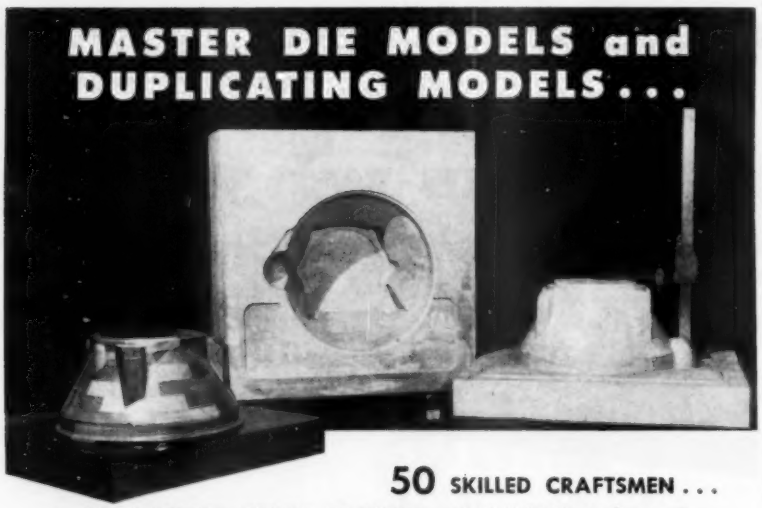
PLATING SOLUTION FILTER
. . . has increased capacity

A portable filter that has 3.5 sq. ft. of filter area has been announced by Hanson-Van Winkle-Munning Co. Compact design of a new plating solution filter has been combined with an increased capacity up to 900 gph free flow.

New design features a solution entrance at the bottom of the unit and discharge at the top in order to effectively prevent the liquid from by-passing the filter. A special transparent casing permits visual inspection of filtering action by the operator.

The components will resist alkalies, weak acids, and will withstand even limited quantities of organic brighteners.

Circle No. 228 on Reader Service Card



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working in **WOOD, METAL, PLASTER and PLASTICS,** *solve pattern and model problems for all industries . . . from design to finished assembly.*

- **MASTER DIE MODELS** for die cast parts, built to Vernier Height Gage Accuracy.
- **DUPLICATING MODELS** for all types of duplicating equipment.
- **MASTER DIE MODELS** for stamped parts—for largest presses.
- **PRODUCTION PATTERN EQUIPMENT.**
- **FIXTURES and GAGES,** for dimensional checking of production castings and stampings.
- **COMPLETE PROTOTYPE SERVICE,** from design to finished prototype assembly.
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- **PRODUCTION PLASTIC MOLDING** — transfer and compression.
- **PRODUCTION PLASTIC EXTRUSION.**
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TELEPHONE: KLONDIKE 4691

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SELF-BALANCING INDICATOR
. . . features built-in selector switches

This indicator, by the Thermo Electric Co., provides a convenient and highly accurate means of checking many temperatures from remote or nearby points. The key switches accommodate up to 48 points for thermocouples and 36 for resistance bulbs while push-buttons accommodate up to 24 points for either. There are 30 scale ranges covering -400 F. to -3000 F. for all standard thermocouple calibrations and -100 F. to -600 F. for resistance bulbs.

Circle No. 229 on Reader Service Card

CASTING REPAIR
. . . in easy to use kit form

A repair kit for castings and tools is being offered by Houghton Laboratories, Inc. Based on epoxy resins, the smooth, aluminum colored paste will cure at room temperature and is contained in two flexible tubes. Equal length bead from each tube insures correct proportions.

Circle No. 230 on Reader Service Card

DUEL DRILLING AND TAPPING MACHINE
. . . needs only one operator

Developed by Govro-Nelson Co., the new machine is designed to speed up multiple drilling and tapping operations. The two-position machine incorporates two vertical and five horizontal units for drilling and tapping 12 holes in three similar parts. Two holes are drilled in one position and ten holes are tapped in the second position. The output is 300 parts per hour.

Circle No. 231 on Reader Service Card

HIGH-PERMEABILITY ALLOY
. . . now commercially available

Alfenol, a soft magnetic material which couples high permeability with high wear resistance, has been made commercially available by Hamilton Watch Co. This alloy of 16%Al 84%Fe contains no strategic elements normally associated with high-permeability materials. It is lighter and harder than other high-permeability alloys and is particularly suitable for applications in which wear is a problem.

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Circle No. 82 on the Reader Service Card

SPRUEMASTER

- Increases Production
- Economical
- Lessens Fatigue
- Powerful Holding

Other Sprue Sizes and Shapes Available to Fit Present Handle!

The unbelievably lightweight SPRUEMASTER will increase production and lessen operator fatigue in all die casting shops. Made of high-strength aluminum alloy, the SPRUEMASTER provides complete safety and convenience.

Size	1-24 ea.	25-48 ea
10-inch	$12.00	$11.50
15-inch	$15.00	$14.25

OSBORN MFG. CO.

Dept. JO-2 • WARSAW • INDIANA

TECHNICAL

continued from page 61

benefit from the increased tempo of work to improve casting quality.

Likewise, new materials used by the die casters to avoid downtime and to increase the life of working parts of their die casting equipment can be reflected in higher output per hour and, consequently, lower piece price to the user.

MECHANIZATION The drive to cut down on the labor-content of die castings is being pursued steadily, with an increasing number of plants putting in fully mechanized casting and/or finishing departments, complete with conveyorized handling. (See page 75.)

Along these lines are developments in the offing toward greater automation of the die casting process itself. Even in job shops, where flexibility to produce a wide variety of types of castings is required, new attention is being given to plant layout and mechanized techniques to make production and finishing more nearly automatic.

Aluminum & Zinc
DIE CASTINGS

Help.....
Equipment.....
Inventiveness..
Capability.....
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TOOL AND MOLD CORPORATION

DESIGNERS & FABRICATORS

of
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for the
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Complete designing and engineering. Modern plant & equipment includes BG-21 4' x 6' & BL-3620 Keller Duplicators.

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For Over 50 Years Customers Have Sung the Praises of STROH DIE CASTINGS!

Over half a century of blending Experience, Equipment and "Know-How" has always made sweet music for **STROH** clients. NOW we have added to our zinc die casting facilities **ALUMINUM** operations. You will enjoy the smooth way we handle your requirements. Tune in on **STROH** and you will never switch to another station.

INQUIRIES INVITED!

STROH DIE CASTING Co. INC.
11123 W. Burleigh St., Milwaukee 10, Wisconsin

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METALS FORECAST

continued from page 62

show an annual consumption of magnesium for die castings of 6.8 million pounds (3,400 tons). This represents a steady growth over previous years. This company, in speaking of the future for this metal, says . . . "Marketing emphasis for magnesium die castings is unchanged with this exception: The industry is making its first serious try at developing military applications. Now, casters are actively seeking business from missile makers. Die castings have been designed for fins, internal structural members and nose cones.

"In the non-military field the uses of magnesium are expanding where-ever weight is a premium. Two prominent motor manufacturers are using thousands of pounds of magnesium die cast end bells on fractional horsepower motors.

"Pistons for internal combustion engines are now being extruded successfully from magnesium-thorium-manganese alloy. With this alloy expansion is controlled and it is reported that with these pistons one-third more horsepower at one-third less weight than aluminum pistons has been shown. Should a demand for such pistons develop there is no reason why they cannot be successfully die cast."

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the Doehler-Jarvis Division, National Lead Co. Claus has been sales manager in Grand Rapids since 1948.

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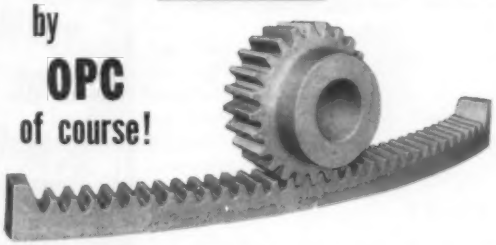

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Kish is a graduate of M.I.T. and has a Master's Degree in Electrical Engineering. He joined Sel-Rex in 1952. Kish was part of a team responsible for two 50,000 ampere single unit rectifiers, largest in the country and used at an Atomic Energy Installation.

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- Designed and made of special alloy *steel*, they prevent cracking . . . bottom breakout . . . spout erosion.

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Edward L. Carlson

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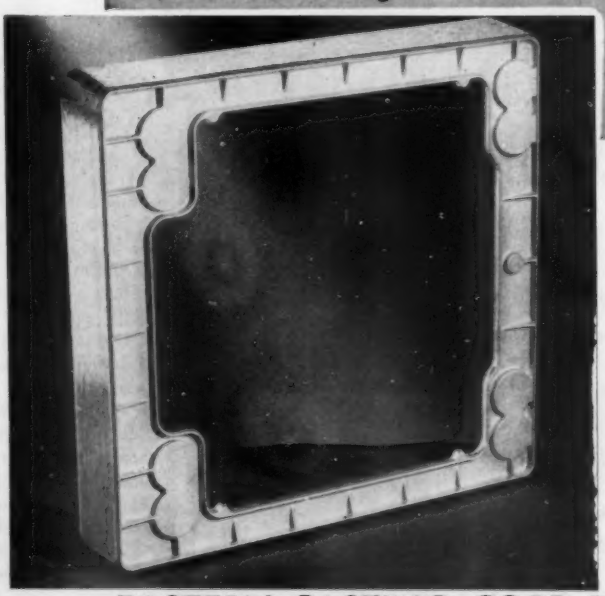

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Lang has been associated with Lindberg for more than 20 years. An electrical engineer, he is a member of the American Institute of Electrical Engineers, and the Society of Die Casting Engineers.

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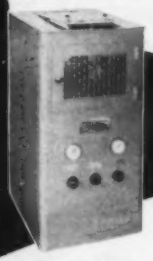

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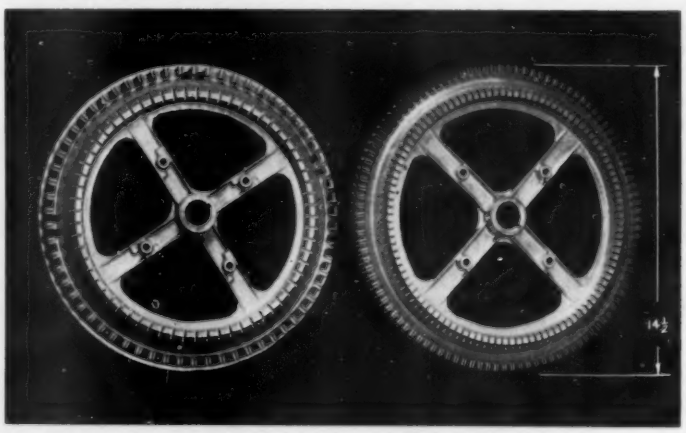

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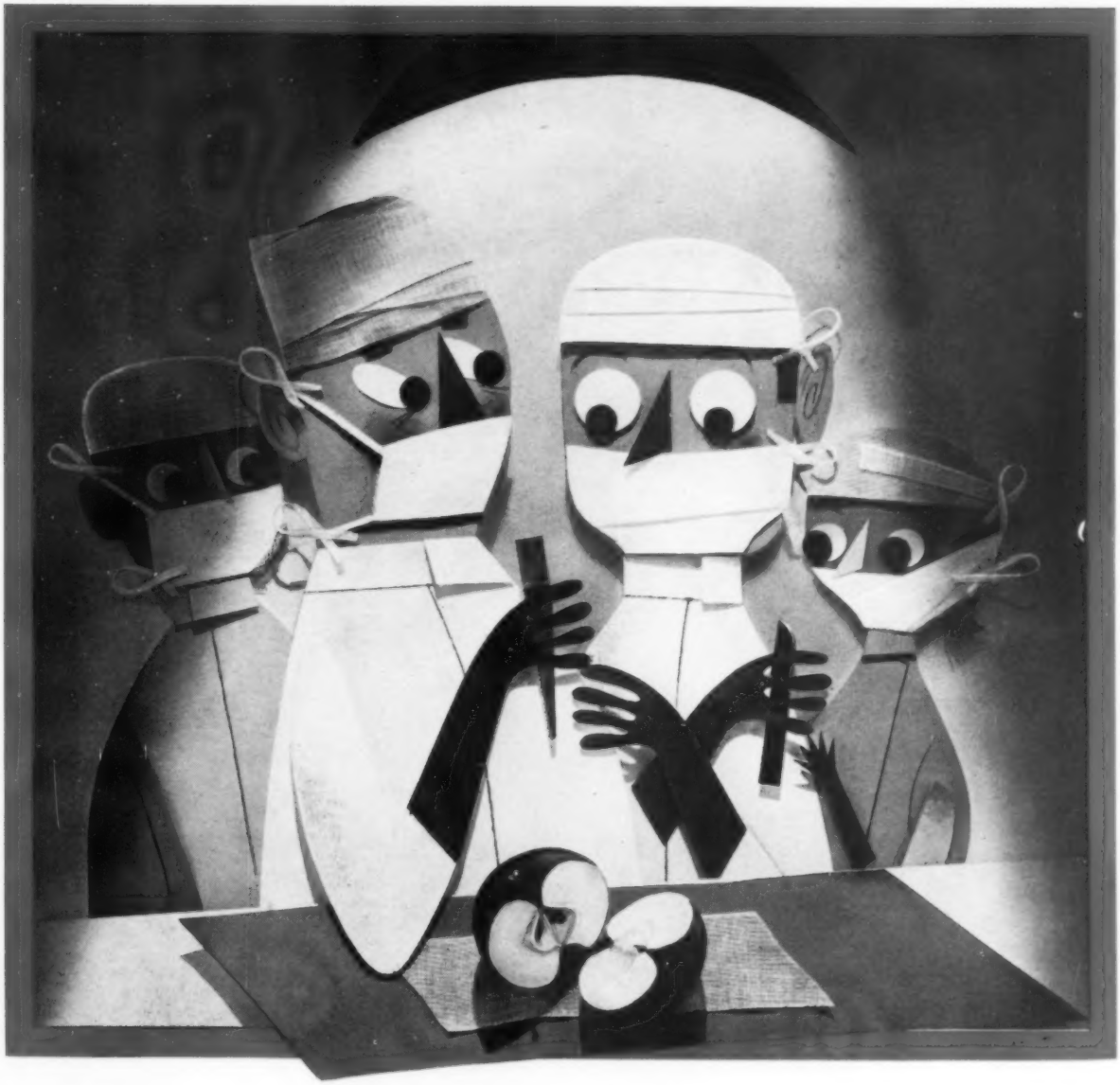

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